THE MADRAS PRESIDENCY
WITH MYSORE, COORG AND THE ASSOCIATED STATES

BY

EDGAR THURSTON, C.I.E.

SOMETIME SUPERINTENDENT OF THE MADRAS GOVERNMENT MUSEUM

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EDITOR'S PREFACE

THE casual visitor to India, who limits his observations of the country to the all-too-short cool season, is so impressed by the contrast between Indian life and that with which he has been previously acquainted that he seldom realises the great local diversity of language and ethnology. This local variety, however, receives expression even in the forms of administration; for the success of the British rule in India is largely due to the fact that the early administrators adopted the local systems of government and moulded them gradually according to the lessons of experience. And this was because the British occupation was that of a trading company of which the present Government of India is a lineal descendant—a fact too often apparently overlooked in the modern administration of the country.

The recent enlargement of the functions of the Local Governments, and more complete management of local affairs, with the formation of Executive, and extension of the Legislative, Councils, all tend to direct more intensely the people's thoughts to the affairs of their own provinces. It is hoped that these Provincial Geographies will in some way reflect this growing tendency to develop special provincial atmospheres, and with this object in view endeavours

have been made to select as authors those who, besides having an accurate and detailed knowledge of each area treated, are able to give a broad view of its features with a personal touch that is beyond the power of the mere compiler.

Among the "provinces" the Madras Presidency has above all developed an individuality of its own—advanced in education through early missionary effort, free of frontier worries, comparatively homogeneous in ethnic composition, and sufficiently unknown to the Central Government to escape undue interference, its officials and its people are distinctly "Madrassi," and are rightly proud to be so. No geographical unit could more appropriately be selected to initiate this series, and everyone who knows the Senior Presidency will recognise the pre-eminent fitness of Mr Edgar Thurston to give a true picture of South India. As Superintendent of the Madras Museum for 25 years, he sampled every form of natural product in the south. As Superintendent for many years of the Ethnographic Survey, he travelled through every district and obtained an intimate acquaintance with the people, his numerous publications on Ethnography being summed up in his encyclopaedic work on the *Castes and Tribes of Southern India*. Old friends, whose number cannot be counted, will recognise Mr Thurston's touch throughout the book: no one else could so readily recall an appropriate story or legend to add to the human interest of nearly every place mentioned; many of those whose interests are more human than geographical will read the book merely because of the Author's personality. Nothing better could be said of it, and no

better recommendation could be offered to those who have not had the privilege of knowing Mr Thurston personally.

The Author has had the willing help of several friends, among whom might specially be mentioned Mr J. S. Gamble, C.I.E., F.R.S., who, as an old official of the Indian Forest Department, has dealt authoritatively with the chapter on the Flora and Forests. Mr E. B. Havell, who is well known by his charming books on Indian Art, has contributed the chapter on Architecture, a subject which he had an opportunity of specially studying when for many years he was Principal of the Madras School of Art, while Mr George Romilly, who, as the representative for many years of the planters' community on the Legislative Council, has given the benefit of his personal knowledge of, and successful commercial experience with, the planting industries. For the shortcomings of the chapter on Geology I am mainly responsible.

We are indebted to various friends, official and private, for permission to use photographs and maps, and the source of each illustration is acknowledged in the list.

T. H. H.

May 1913.

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Figs. 23 and 94 are from photographs by Messrs Barton, Son and Co., photographers, Bangalore.

CHAPTER I

AREA; BOUNDARIES; DIVISIONS

THE large tract of country dealt with in the present volume includes: (*a*) the **Madras Presidency**, or Presidency of Fort St George, so named after the patron saint of England; (*b*) the States of **Travancore** and **Cochin**, and the smaller States of **Pudukkottai**, **Banganapalle**, and **Sandur**, which have political relations with the Government of Madras; (*c*) the State of **Mysore**, and the small British Province of Kodagu or **Coorg**, which have direct political relations with the Government of India; (*d*) the **French Possessions**, all of which, with the exception of Chandernagore in Bengal, are situated in the south of the Peninsula.

The title of Presidency, as applied to Madras, which has been called in disparagement the Benighted Presidency or the Cinderella of the Indian Provinces, and more happily Clive's Province, had its origin in the seventeenth century, when the Agent of the East India Company was raised to the rank of President, independent of Bantam in Java. The city of Madras is still known in official parlance as the Presidency, in contra-distinction to the outlying and up-country districts and stations, which are known as the mofussil (mufassal, provincial).

The etymology of the name **Madras** has been the subject of much speculation. It has, for example, been connected with a legend concerning a fictitious fisherman named

Madarasen. The suggestion has been made that it is a corruption of Manda-rājya, meaning realm of the stupid, or of the Portuguese Madre de Dios. A further suggestion is that it is derived from a Telugu ruler named Mandaradzu.

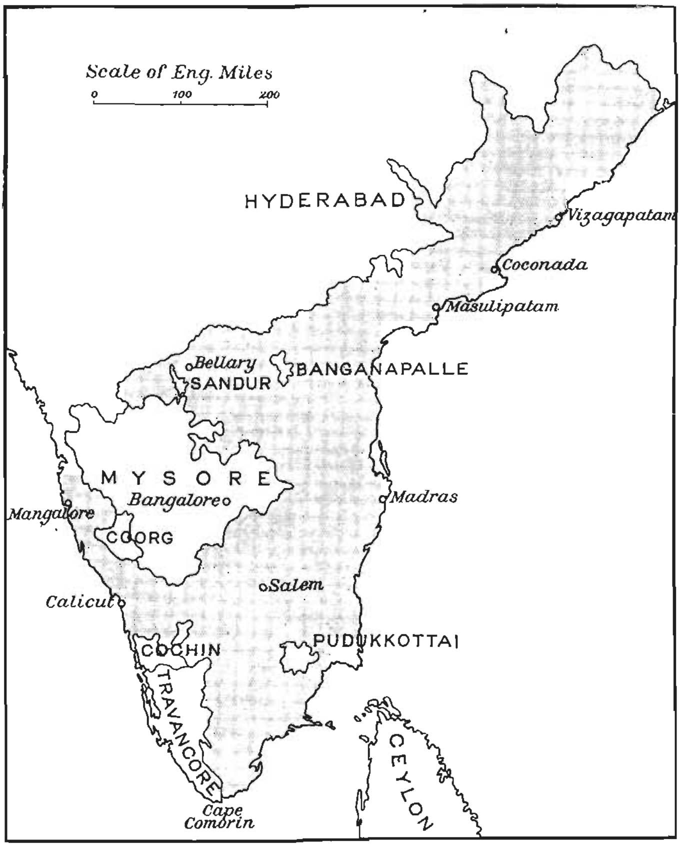

Fig. 1. Madras Presidency, Coorg, and associated States.

The firman from the Nāyak or chief, from whom Mr Francis Day acquired permission, in 1639, to settle at Madras, and build a fort, refers to "our port of Madraspatam" (Madras

city). In a seventeenth century print, Madirass is shown on the north of Fort St George. The authors of *Hobson-Jobson* point out that the earliest maps show Madraspatanam as the Muhammadan settlement, and suggest that the name is probably of Muhammadan origin, and connected with Madrasa, a college. The name now applied by Indians to the city of Madras is Chinnapatanam, which is commonly said to be derived from that of Chennappa, the father of the Nāyak from whom permission to build Fort St George was obtained. The name Chīnāpatan occurs on coins of the Moghul Emperors Aurangzīb and Farrukhsiyar struck at Madras. It would seem improbable that the name is, as has been suggested, connected with the intercourse of the Chinese with South India, though Mendoza, in his book on China published in 1585, refers to

Fig. 2. Chīnāpatan Rupee of Aurangzīb.

a town on the Coromandel coast "called unto this day the Soile of the Chinos, for that they did reedifie and make the same." Chinese coins are, it may be noted, occasionally picked up on the sea-shore at Mahābalipuram (Seven Pagodas), 35 miles south of Madras.

The **Travancore State** is situated in the extreme south-west of the Peninsula, and extends southward to Cape Comorin. It is bounded on the north by the Cochin State, on the east by the western ghāts or ghauts, and on the west by the Arabian Sea, which has been defined as the name applied to the portion of the Indian Ocean bounded east by India, north by Baluchistan and part of

the southern Persian littoral, west by Arabia, and south, approximately, by a line between Cape Guardafui, the north-east point of Somaliland, and Cape Comorin. The State has its own currency, the coins being minted at the capital Trivandrum or Tiru-ananthapuram, the holy city of Anantha, in whose name coins called Ananthan cash, and Ananthan varāhas or pagodas, have been struck. At the religious ceremony called *tulabhāram* or tulupurushadānam (tulu, scales; purusha, man; dānam, gift), the Mahārāja is weighed in scales against gold coins called tulabhāra kāsu, specially struck for the occasion, which are subsequently distributed among the priests and Brahmans.

The **Cochin State** is, for the most part, bounded on the north by the district of Malabar; on the east by the Malabar and Coimbatore districts, and Travancore; on the west by Malabar and the Arabian Sea; and on the south by Travancore. The isolated tāluk (subdivision) of Chittūr is entirely surrounded by the districts of Malabar and Coimbatore. Coins, called puthans, were formerly current in the State, but, owing to the large number of forgeries that had found their way into circulation, and the difficulty of handling the puthans in Treasury transactions, they were withdrawn from circulation, and, since 1900, the British Indian coins have been the sole currency.

Both Travancore and Cochin were principalities before the supremacy of the British, and are held under treaties made originally with the East India Company. They pay subsidies which were originally payments for military protection by the British. The troops were ultimately withdrawn, and the military protection is now by troops outside the territories of the States.

The **State of Pudukkottai** (new fort), which has an area of 1,100 square miles, is surrounded by the districts of Tanjore, Madura and Trichinopoly, and occupies the territory formerly known as Tondaimandalam (the Tondimān

country) after the family name of the ruling chief. The State was given to a former Tondimān as a reward for faithful services to the British during the military operations against the French, Haidar Ali, and the poligars or feudal chiefs of Madura and Tinnevelly, in the eighteenth century. Copper coins called Amman kāsu (goddess cash) are still current within the State, and their greatest circulation is during the Navaratri or Dusserah festival, when they are distributed along with a dole of rice.

The **Banganapalle State** (255 square miles) is situated on the Deccan table-land within the Kurnool district. A title-deed, dated 1761, records that the Nizam appointed a certain Muhammadan as Kiladar (commandant) and Faujdar (magistrate) of Banganapalle. When the Nizam handed over the Ceded Districts, including Kurnool, to the British in 1800, the control was transferred to the British Government. In 1871, the Muhammadan head of the State received the hereditary title of Nawāb.

The **Sandur State** (161 square miles), which is bounded by the Bellary district and a corner of Mysore, is situated in a valley shut in between two ranges of hills. The sanitarium of Rāmandrūg, called after a celebrated poligar or feudal chief named Komāra Rāma, is situated on a plateau 3256 feet above the sea. The State was originally feudatory to the Marāthas, and was handed over to an ancestor of the present Marātha Rāja by a sanad or deed of grant. The family name of the Rājas, Ghorpade, is connected with a legend, according to which one of them scaled a precipitous fort by clinging to a big lizard (ghorpade), which was crawling up it.

The **Mysore State**, which has been described as a rocky triangle, is situated on a table-land or plateau, where the eastern and western ghāts converge towards the Nīlgiri hills. It is surrounded by the Madras Presidency except in parts of the west and north, where Coorg and the

Bombay Presidency form the boundaries. It naturally divides itself into the malnād or hill country on the west, and the maidān or open country to the east. For administrative purposes, it is divided into eight districts, viz. Bangalore, Kolar, Tumkur, Mysore, Hassan, Kadur, Shimoga, and Chitaldroog. The State is best known in history in connection with the Muhammadan usurpers Haidar Ali and his son Tīpu (or Tippoo) Sultan in the latter part of the eighteenth century. On the death of Tīpu, Krishna Rāja Wodeyar, the representative of the Hindu (Wodeyar) dynasty was placed on the throne, but deposed by the British Government some years later. The rendition of the State, in connection with which the Mahārāja was placed on the throne by the Governor of Madras, took place in 1881. The mint was abolished in 1843. Many specimens of the coins of Tīpu Sultan and Krishna Rāja Wodeyar can still be obtained in the bazars of Bangalore, Mysore, Seringapatam, etc.

Coorg is a mountainous province, situated to the west of Mysore on the summit and slopes of the western ghāts, with Mercāra as its principal town. The reigning Rāja, who had shown marked signs of disaffection, was deposed in 1834, and the Commissioner of Mysore was appointed Commissioner of the new British province. The deposed Rāja visited England in 1852 with his young daughter, to whom Queen Victoria stood sponsor through the Archbishop of Canterbury at her baptism. The Kodagas or Coorgs, who form 20 per cent. of the population, are a stalwart race, among whom many ceremonies still take the form of indicating physical fitness. They wear a picturesque full-dress consisting of dark cloth coat showing the arms of a white shirt, with a red or blue girdle, in which a war-knife with an ivory or silver hilt is stuck.

The **French Possessions** consist of Pondicherry, Kārikāl,

and Yanam or Yanaon on the east coast, and Mahē on the west. The settlement of **Pondicherry** (115 square miles), which includes the town of the same name, is surrounded by the South Arcot district, except on the east, where it faces the Bay of Bengal. The name Pondicherry, which has sometimes been spelt Pont de Cheree, is a corruption of Puduchchēri (new town). In early records reference is made to Phoolcheri, and silver coins struck by the French Company bear the name Phulcheri in Persian characters. **Kārikāl** (53 square miles) is surrounded on three sides by the Tanjore district, and bounded on the east by the Bay of Bengal. Many coolies emigrate thence to the French colonies. The little settlement of **Yanam** (5 square miles) is situated on the banks of the Gautami Godāvari and Coringa rivers, and surrounded by the Godāvari district. **Mahē** (26 square miles), named after the distinguished Frenchman, Mahé de la Bourdonnais, is picturesquely situated at the mouth of a river on the Malabar coast, about four miles south of Tellicherry. The French have also a loge, consisting of about six acres on the sea-shore, about half a mile north of the lighthouse at Calicut in Malabar. In the town of Masulipatam, on the east coast, the quarters of several European nationalities, which have carried on trade there, are recognised. These are known as the English pālem, Valanda (Hollander) pālem, and French pettah, the ownership of which is still vested in the French Government.

It is recorded by Sir Mountstuart Grant Duff, a former Governor of Madras, that "when I was passing through Rome, Biancheri, the speaker of the Italian Parliament, said to me, 'What is the size of this country you have been governing?' 'It is,' I said, 'larger than Italy, including all the Italian islands.' 'Good heavens,' he replied, 'what an empire is that, in which such a country is only a province!'" The **area and population** of the British

territories and Native States, as recorded at the census, 1901, were as follows :—

	Area sq. miles	Population
Madras Presidency and Feudatory States	143,221	38,623,066
Mysore	29,444	5,539,399
Travancore	7,091	2,952,157
Cochin	1,361	812,025
Coorg	1,582	180,607

The area under consideration is situated within the Tropic of Cancer between 8° 5′—20° 26′ N. latitude, and 74° 34′—85° 12′ E. longitude. It embraces the whole of the southern portion of the Indian peninsula, which narrows southward to the extreme point at Cape Comorin or Kanniyakumāri—the *Komaria akron* of Ptolemy—where stands a temple dedicated to Kanniyāmbāl, the virgin goddess, which is a favourite resort of Hindu pilgrims, who bathe in the sea. The irregular northern boundary, due to the accident of history, and not to ethnic or physical considerations, is formed from east to west by Orissa, the Central Provinces, the Native State of Hyderabad or the Nizam's Dominions, and the southern districts of the Bombay Presidency. The west and east coasts are washed respectively by the waters of the Arabian Sea, and those of the Bay of Bengal and Gulf of Manaar. This gulf, which is named after the island of Manaar off the coast of Ceylon, separates the Rāmnād and Tinnevelly districts of the Madras Presidency from the island of Ceylon. It is bounded on the north by the chain of rocks called Adam's Bridge, concerning which the legend runs that the common striped or palm-squirrel (*Sciurus palmarum*) was employed by Rāma to assist the army of monkeys in the construction of the bridge to connect Pāmban island with Ceylon, whither Rāvana had carried off his wife Sīta. The squirrel helped the monkeys by rolling in the sand on the shore, so as to collect it in its hairy coat, and then deposited it between the piled-up

stones, so as to cement them together. Seeing it fatigued by its labours, Rāma sympathetically stroked its back with the three middle fingers of his right hand, the marks of which still persist in the squirrels at the present day. According to tradition, the temple at Rāmēsvaram was founded by Rāma as a thank-offering for the success of the expedition against Rāvana. The possibility of making an artificial union between South India and Ceylon by means of a railway across Adam's Bridge is at the present time under consideration.

North of the Gulf of Manaar are Palk's Straits and Bay, named after Mr Robert Palk, Governor of Madras, 1763—1767. The name "Palk's Streights" appears in a survey chart dated 1764. The Bay is bounded on the west by the coast of the Tanjore and Rāmnād districts, and the promontory of Point Calimere, which is 40 miles distant from Point Pedro in Ceylon. The reserved forest of Point Calimere is noted for its black-buck (antelope), spotted deer, and wild pigs.

The Madras Presidency has been roughly divided into five natural divisions, viz. (1) the strip facing the Arabian Sea, which is commonly known as the west coast; (2) the central table-land, or Deccan; (3) the Agencies; (4) the east coast division, extending from Ganjam in the north as far south as the Nellore district; (5) the southern division, including the whole of the Tamil country, which is spread over the districts of North Arcot, Madras, Chingleput, Salem, Coimbatore, South Arcot, Tanjore, Trichinopoly, Madura, Rāmnād, and Tinnevelly.

The **west coast**, which is bounded on the west by the Arabian Sea, and on the east by the western ghāts, comprises the districts of South Canara and Malabar or Malayālam (the hill country), and the Native States of Travancore and Cochin, all of which are included in the ancient kingdom of Kērala. According to the legend,

Parasu Rāma (Rāma of the axe), an incarnation of Vishnu, secured from the gods permission to reclaim some land from Varuna the sea-god. Accordingly, he threw his axe from Cape Comorin as far as Gokarnam in South Canara, and immediately the sea receded, and there was dry land between these places as far as the western ghāts. To people this land, he brought the Nambutiri Brahmans from the north, gave them peculiar customs, such as the marumakkatāyam law of succession (descent in the female line), and located them in sixty-four grāmams (Brahman villages). To rule over the people, an individual named Kēya Perumal was selected, who was the first king of Malabar. The name Kērala is at the present day perpetuated in the masonic lodge called Lodge Kērala at Calicut.

The name **Deccan** (dakhan, the south) has been applied by some writers to the whole of the Peninsula south of the Nerbudda river, but is more properly restricted to the table-land between the eastern and western ghāts. It includes the Cuddapah, Kurnool, Bellary, and Anantapur districts, which are also known as the Ceded Districts, as they were ceded to the British in 1800, after the death of Tīpu Sultan.

The **Agencies** include the mountainous western portions of the Ganjam, Vizagapatam, and Godāvari districts in the north-east of the Presidency, which are inhabited by various wild tribes, e.g. the Kondhs, Savaras, and Koyis, who "differ in religion, language, customs, and ethnic characters, from the dwellers in the plains below them. Within these tracts, the ordinary law of the land is in force only to a limited extent. Collectors (or chief administrative officials) have extended and unusual judicial authority, both civil and criminal, which they exercise under the special title of Agents to the Governor."

The name **Northern Circars** or Sirkars (divisions of

territory) has been applied to the territory to the north of the Coromandel coast, which includes the districts of Ganjam, Vizagapatam, Godāvari, Kistna, and Guntur. The original Circars of Chicacole, Rajahmundry, Ellore, Kondapille, and Guntur, were the subject of a grant obtained by Clive from the Great Moghul in 1765. The tract of country known as the Northern Circars corresponds approximately with that which, in early times, formed the kingdom of Kalinga. The port of Calingapatam in Ganjam, and the Oriya Kalinji and Telugu Kalingi castes, still preserve the ancient name. Kling (a corruption of Kalinga) is applied in the Malay countries, including the Straits Settlements, to the people of Peninsular India who trade thither or are settled in those regions. The phrase Orang Kling Islam, i.e. a Muhammadan from the Madras coast, which occurs in Patani Malay, refers to the Labbai and Marakkāyar Muhammadans, who go to the Straits Settlements for the purpose of trade.

The name **Coromandel** was formerly applied to the east coast of the Madras Presidency, extending northward from Point Calimere to the mouth of the Kistna river, or even further. The origin of the name has given rise to much discussion. Thus it has been derived by different authorities from Kuru-mandala, the realm of the Kurus, kuru-manal, black sand, chola-mandalam, the country of the cholam millet, and khara-mandalam, the hot country. It seems most probable that the name is a corruption of Choramandala or Chola-mandala, i.e. the kingdom of the Cholas, who, in the tenth century, had their capital at Tanjore.

Ma'bar, which must not be confused with Malabar, is said by Ibn Batuta, the Arab traveller, who visited South India in the fourteenth century, to be the name which the Arabs gave to the coast of Coromandel. In Marsden's edition of *The Travels of Marco Polo*, Maâbar is defined as an appellation, signifying passage or ferry, given by the

Muhammadans to Tinnevelly, Madura, and perhaps the Tanjore country, from their vicinity to Adam's Bridge. Viceroys were appointed by the Sultans of Delhi to govern this country. Copper coins are found in the bazars, bearing the names of the Sultans Muhammad Taghlak, Kutb-ud-din, etc., and of the usurping Viceroy Jalāl-ad-din Ahsan Shāh, who struck coins in his own name.

The name **Carnatic**, meaning Canarese country, has been loosely applied to the Tamil country of Madras, and the Telugu district of Nellore. According to one definition, "the province known as the Carnatic, in which Madras was situated, extended from the Kistna to the Coleroon river, and was bounded on the west by Cuddapah, Salem, and Dindigul, all of which formed part of the State of Mysore. The northern portion was known as the Moghal Carnatic, the southern the Mahratta Carnatic." In discussing the modern misapplication of the name, Bishop Caldwell writes that "when the Muhammadans arrived in Southern India, they found that part of it with which they first became acquainted—the country above the ghāts, including Mysore and part of Telingāna (the Telugu country)—called the Karnātaka country. In course of time, by a misapplication of terms, they applied the same name Karnātaka or Carnatic to designate the country below the ghāts, as well as that which was above. The English have carried the misapplication a step further, and restricted the name to the country below the ghāts, which never had any right to it whatever, and what is now geographically termed the 'Carnatic' is exclusively the country below the ghāts on the Coromandel coast." The line of Nawābs of the Carnatic, which commenced with Zu-l-Fikar Khān in 1692, terminated with Ghulam Muhammad Ghaus Khan, who died in 1855. In 1883 a masonic lodge, called Lodge Carnatic, was founded in Madras for Indian freemasons.

CHAPTER II

MOUNTAINS

THE two main mountain systems of Southern India are called respectively the **eastern** and **western ghāts**, which include between them the great table-land of the Deccan and Mysore, and meet at an angle in the Nīlgiri Hills. The word **ghāt**, in its proper application, means a path of descent or steps leading to a river, such as the celebrated bathing-ghāt at Benares, or a mountain pass. In the latter sense, it is correctly used by Sir Walter Scott in *The Surgeon's Daughter*, which deals with Madras and Mysore in the time of Haidar Ali. The word is now generally applied to the mountain ranges or ghāts, through which the passes lead. The best known of such passes is the Coonoor ghāt on the Nīlgiris, which can be ascended either by the ghāt road, or by the mountain railway. The road, cut through the hill-side, is protected by a stone parapet, to prevent vehicles from falling down the precipitous hill-side or khud. The steep bluff called Hulikal Drūg (tiger-stone fort), or more commonly the Drūg, at the south end of the ravine which forms the Coonoor ghāt, is surmounted by an old fort, and derives its name from a legend relating to a man-eating tiger which once infested the neighbourhood. Other ghāts on the Nīlgiris are the Sigūr, Gudalūr, Karkūr, Sispāra and Kotagiri ghāts, which lead to the Mysore and Wynaad table-lands and the plains of Malabar and Coimbatore.

The name **Nīlgiris** or Blue Mountains (nīlā-giri) is probably derived from the blue haze which hangs over the

Fig. 3. Toda mad or mand.

hills when viewed from the distant plains, and not, as has been suggested, to the periodical diffused flowering of the blue *Strobilanthes*. The Nīlgiri plateau, which has an average altitude of about 6,500 feet above the sea, consists largely of open grassy "downs" dotted with wooded sholas (glades), in the vicinity of which a Toda mand or mad (settlement), composed of half-barrel-shaped dwelling-huts and dairy, and cattle-pen, may be seen here and there. The highest point on the Nīlgiris is the summit of Dodabetta (big hill) rising to a height of 8,760 feet above the sea, on which cinchona, jalap, and ipecacuanha, have been successfully cultivated. Ootacamund, the hot-weather headquarters of the Madras Government, lies in an amphitheatre surrounded by Dodabetta, Snowdon (8,299 feet), Elk hill (8,090 feet), and Club hill (8,030 feet). The name elk, it may be noted, has been wrongly applied by sportsmen to the sāmbar deer. A conspicuous feature of the landscape, as one looks westward from Ootacamund, is the **Kundah range**, which rises precipitously from Malabar, with the triangular hill called Mūkarti (cut nose) peak (8,403 feet). Further west, beyond Naduvatam, where the Government cinchona factory is situated, is the beautiful Ouchterlony valley, named after Mr James Ouchterlony, a pioneer of coffee cultivation on the Nīlgiris, which has been extensively opened up for planters' estates. At the east end of the plateau is the sacred hill called **Rangaswāmi peak**, with the isolated pillar rock named Rangaswāmi pillar. Of the indigenous people who inhabit the plateau, the best known are the pastoral and polyandrous Todas, who maintain a large-horned race of buffaloes, on whose milk, and the products thereof, they depend largely for existence. The agricultural element is represented by the Badagas, and the artisan by the Kotas. The Badagas live in villages, often situated on the summit of low hillocks, and surrounded by the fields which yield the crops. Their

Fig. 4. Toda buffaloes

number was returned at the census, 1901, as 34,178, against 1,267 Kotas, and 807 Todas. The Kota's inhabit seven villages, of which six are on the plateau, and one is on the western slopes at Gudalur. They are the blacksmiths and goldsmiths, carpenters, rope-makers, and potters of the hills, and are also employed in cultivation. They are, further, the musicians at Toda and Badaga funerals, for which they provide the band. The jungles on the slopes of the hills are inhabited by the primitive Kurumbas and Irulas, some of whom work for the forest department or on planters' estates.

The **Wynaad table-land**, situated at an average height of 3,000 feet above the sea, stretches from the foot of the northern slopes of the Nīlgiris into Malabar and the Mysore plateau. The dense jungles have been opened up by planters for the cultivation of coffee, tea, and pepper, which gives employment to a large number of Canarese and Tamil coolies (hired labourers). In the middle of the last century, when planters first began to settle in the Wynaad, they purchased the land with the Paniyans living on it, who were practically slaves (*adscripti glebæ*) of the land-owners.

The **Western Ghāts**, which commence in the Bombay Presidency, extend southward through South Canara (which they separate from Mysore), Coorg, Malabar, Cochin, and Travancore, and terminate near Cape Comorin in the extreme south of the Peninsula. The range is continuous and unbroken, except for the natural break, 16 miles wide, formed by the Palghāt Gap between the districts of Coimbatore and Malabar, by means of which, even before the days of the railway, communication between the Tamil and Malabar countries was easy. The difference in the appearance and customs of the indigenous population, cultivation, and scenery, eastward and westward of the Palghāt Gap, is very marked. The Western Ghāts range

from about 3,000 to 8,000 feet above the sea, and, in Ānaimudi (elephant forehead) peak in the High Range of Travancore, possess the highest point (8,837 feet) in Southern India. A conspicuous peak in South Canara called Kudremukh (horse's face), which is resorted to by officials as a hot-weather sanitarium, reaches a height of 6,215 feet above the sea. South of the Palghāt Gap are a series of hill ranges, which have received a variety of names. The **Ānaimalais**, or elephant hills, which extend from the Coimbatore district southward into Travancore, are inhabited by Kādirs, Muduvars, Malasars, and other hill tribes. An important forest station is situated, in the midst of a dense bamboo jungle, at Mount Stuart, playfully named after Sir Mountstuart Grant Duff, who visited the spot when Governor of Madras. On the Ānaimalais, elephants are caught in pits—made with hands and covered over with bamboo and earth for the purpose of securing them—and tamed. The forests of the **Nelliampathis** (1,500 to 5,000 feet) in the Cochin State have been opened up in recent years by the Cochin Forest Department for the sake of their timber. Further south, in Travancore, are the **Cardamom** and Pīrmed hills (3,000 to 3,500 feet), with the hill-station of Pīrmed. In the southern portion of the ghāts is the conical peak called Agastyamalai (6,200 feet), where the sage Agastya Maharshi, who is regarded as the pioneer of Aryan civilisation in Southern India, is supposed still to live as a Yōgi in pious seclusion. The **Palni hills**, which run out from the main line of the ghāts in a north-easterly direction in the Madura district, derive their name from the town of Palni. Thither devotees flock from Malabar and other places to worship at the shrine of Subramaniya, some with silver mouth-locks, others with a skewer piercing the cheeks, or carrying a kāvadi (portable shrine) containing milk or fish. The Palnis are divided into the Eastern Lower Palnis (3,000 to 4,000 feet), and

Fig. 5. General view of Kodaikānal, with the lake.

the Western Palnis with a mean elevation of 7,000 feet, rising in Vembādi Shola hill to 8,218 feet above the sea. In the central portion of the range is the popular hill-station of Kodaikānal (7,200 feet), which is reached by a ghāt road from the town of Periyakulam near the foot of the hills. The crow has not yet found its way to Kodaikānal, and it is on record that a Brahman who had to perform the srādh or anniversary ceremony for his dead father, in which crows play an important part, telegraphed to Periyakulam for a pair of these birds, which duly arrived in a cage. The Palnis are inhabited, among others, by the Kunnuvans, and by the Paliyans, who are also found further south near the foot of the Tinnevelly hills.

The **Eastern Ghāts** have been described as "a disjointed line of small confused ranges which begin in Orissa, pass into Ganjam, the northernmost district of the Madras Presidency, and run through a greater or less extent of all the districts which lie between Ganjam and the Nīlgiri plateau. They are about 2,000 feet in elevation on an average, and their highest peaks are less than 6,000 feet. In Ganjam and Vizagapatam they run close to the shore of the Bay of Bengal, but, as they travel southwards, they recede further inland, and leave a stretch of low country from 100 to 150 miles wide between their easternmost spurs and the sea." In the three northern districts of Ganjam, Vizagapatam and Godāvari, the hill country is included in the Agencies (p. 10). The **Māliahs** or highlands of Ganjam, composed of a series of undulating plateaux, contain the highest peaks, named Singarāzu and Mahendragiri, which rise to a height of nearly 5,000 feet above the sea. Many passes lead into these hills, and include the Kalingia ghāt from Russellkonda, the Munisinghi ghāt from Parlākimedi, and the Taptapāni or hot-spring ghāt, so named from its containing a hot sulphur

spring. The Māliahs are inhabited, among others, by Kondhs, Savaras, Gonds, and Pāno hill weavers. The Kondhs formerly performed human or meriah sacrifices, and the Madras Museum possesses a wooden post from Balligūda, roughly hewn into the shape of an elephant's head, on which the sacrificial victim was tied. In the Vizagapatam district the **Jeypore hills** form a series of plateaux, with an average elevation of 3,000 feet above the sea. In the Agency tracts of the Godāvari district is the Rampa country, which was the scene of many disturbances, commencing at the end of the eighteenth century, and culminating in the Rampa rebellion of 1879. During one of these disturbances, in 1834, the body of one Pāyaka Rao, who was hanged by the British, was suspended in an iron cage on a gibbet. In the jungles of Anantapur there was formerly a gibbet, now in the Madras Museum, from which two iron cages were suspended by iron hooks. According to local tradition, the two ringleaders of a band of dacoits (robbers) were put alive into the cages, and starved to death. On a stone near the gibbet was an inscription recording that two men were hung in 1837 for killing a man by throwing a noose. In the Kurnool district are two ranges of hills called the **Erramalas** (red hills), about 600 feet above the sea, and the **Nallamalais** (black hills) with Bhairani Konda (3,048 feet) as the highest point. The latter are inhabited by the jungle Chenchus, who are said to levy a toll in return for protecting pilgrims on their way to the shrine of Mallikarjuna (Siva) at Srīsailam. The **Pālkonda** or milk hills, which are said to derive their name from the excellent grazing they afford, commence at the sacred hill of Tirumala or Tirupati, and run through the Cuddapah district into Anantapur at an average elevation of 2,000 feet above the sea. In the **Nagari** hills of the North Arcot district are a peak called Nagari Nose (2,824 feet), and a plateau called Kettle Bottom, which serve as

landmarks for ships making the port of Madras. The **Javādi** hills of North Arcot, the **Kalrāyan, Kollaimalai,** and **Shevaroy** hills of Salem, and the **Pachaimalais** of Trichinopoly, are all inhabited by Malayālis (=hill people), who, according to tradition, originally belonged to the Vellāla caste of cultivators, and emigrated from the sacred city of Kānchipuram (Conjeeveram) to the hills when Muhammadan rule was dominant in Southern India. The Shevaroy hills contain the small hill-station of Yercaud or Erkād (4,500 feet). The Malayālis hold an annual festival on the summit of the Shēvarāyan hill, where the temple of the god Servarāyan is situated in the midst of a sacred grove.

The most mountainous region of the Mysore State, situated in the Kadur district, is bordered on the west by the Western Ghāts. It has been said to rise into some of the loftiest peaks between the Nīlgiris and the Himālayas, supporting on its centre the stupendous barrier of the **Bāba Buden** chain, which rises, in Mulainagiri, to 6,317 feet above the sea. The god of the temple at Bēlur is believed to make occasional trips to the Bāba Buden hills to visit the goddess, wearing a huge pair of slippers kept for him at the temple, which are renewed by leather-workers when they become worn out, and presented at the shrine. In the Mysore district, the **Biligirirangan** range reaches a height of 5,091 feet, and, in the Hassan district, the Subrahmanya or Pushpagiri mountain rises to 5,626 feet. Further east, in the Kolar district, the hill range reaches its highest point at Nandidrūg (4,851 feet).

CHAPTER III

RIVERS

FROM the great watershed of the western ghāts, only short rivers flow westward through the plains of South Canara, Malabar, Cochin, and Travancore, into the Arabian Sea, the main drainage making its way for the most part eastward, and emptying itself into the Bay of Bengal.

The Gersoppa Falls, formed by the **Sharāvati** river, and situated on the Bombay-Mysore frontier, derive their name from the village of Gersoppa. The name has been corrupted by Anglo-Indians into Grasshopper Falls. The falls are said to have few rivals in the world in height, volume, and beauty, the river hurling itself over a cliff 830 feet high in four cascades called the Rāja or Horse-shoe, Roarer, Rocket, and La Dame Blanche.

Of the rivers which flow westward, communicating, in many cases, with the extensive system of backwaters (p. 190), may be noted the Netrāvati and Gurpur rivers in South Canara, the Ponnāni, Beypore, and Valarpattanam in Malabar, and, further south, in Cochin and Travancore, the Alwaye, Chālakudi, and Periyar. The **Netrāvati** and Gurpur rivers have a common entrance into the sea at Mangalore. The **Beypore** river flows through the Nilambur valley, and much timber from the forests is floated down to its mouth, near which it is connected with Calicut by the Conolly canal. The **Ponnāni** forms part of the boundary

between Malabar and the Cochin State. The upper waters of the **Periyar**, which rises on the Sivagiri hills, have been utilised in connection with the Periyar Project (p. 203).

Of the rivers which flow eastward into the Bay of Bengal, the most celebrated are the Godāvari, Cauvery, and Kistna.

The **Godāvari** or Godā river (900 miles) rises on a hill in the Nasik district of the Bombay Presidency. At its source the water trickles from the mouth of a graven image. The sacred nature of the river is said to have been revealed to Rāma by the rishi Gautama. According to tradition, it proceeds by an underground passage from the same source as the Ganges, and reaches the sea by seven branches, made by the seven rishis Kasyapa, Atri, Gautama, Bharadvāja, Vasishta, Visvāmitra, and Jamadagni. The pilgrimage, called sapta sāgara yātra, or pilgrimage of the seven confluences, is made especially by those desirous of offspring. The Godāvari flows past the town of Nasik, one of the most sacred places of Hindu pilgrimage, where the banks and bed of the river are studded with bathing-ghāts, temples, and shrines. It traverses the Hyderabad State, and forms the boundary between it and the Godāvari district of the Madras Presidency, being joined by the Sabari or Saveri river. Thence it flows between the Godāvari and Kistna districts, and passes through the gorge, where it is contracted by the eastern ghāts, through which it passes. When the river is in flood, boatmen are said to break a coconut to appease the demon Bīraiya, and so save themselves from being dashed against the rocks, and drowned in a whirlpool. Leaving the hills, the river opens out into broad reaches dotted with islands called lunkas, on the fertile soil of which tobacco is cultivated. After passing Rājahmundry, it divides, at Dowlaishweram, into two branches, the Gautami Godāvari and Vasishta Godāvari, and so reaches the Bay of Bengal. The Gautami Godāvari

flows past the French settlement of Yanam, and enters the sea near Point Godāvari. At its mouth is the Sacramento shoal, where the United States steam frigate *Sacramento* went ashore in 1867. The Vasishta Godāvari reaches the coast at Point Narasapur. A few miles above the entrance into the sea, a branch, called the Vainatēyam, forms the island of Nagaram between itself and the Vasishta Godāvari. The Pushkaram festival, held once in twelve years, during which Telugus bathe at various spots on the banks of the Godāvari, is regarded by them as being of the same importance as the Mahāmakam festival at Kumbakonam (p. 256) is to all Hindus. The ghāt at Rajahmundry, where Hindus bathe in the river, is called Kotilingam (crore of lingams) ghāt, in connection with a legend. Pilgrims who go from the Godāvari district to Benares empty half of the contents of the pots of Ganges water, which they bring back with them, into the Godāvari, and replenish them therefrom.

The **Kistna** or Krishna river (800 miles) rises in the western ghāts, north of the hill-station of Mahābaleshwar in the Bombay Presidency, and enters the Hyderabad State, being joined by the Tungabhadra in the Raichur district of the Nizam's Dominions. On reaching the eastern ghāts, it turns sharply south-east, and, flowing between the Kistna and Guntur districts, passes the town of Bezwāda, and enters the Bay of Bengal by two mouths, one of which is at the low headland of Point Divi. The ruined stupa of Amarāvati is situated on the south bank of the river, which, in the vicinity thereof, is studded with islands or lunkas.

Between the Godāvari and Kistna districts is the **Colair** (Kolleru) lake. This, it has been said, is "the only large natural freshwater lake in the Madras Presidency. Half lake, half swamp, it is a great shallow depression, which was doubtless originally part of the old Bay of Bengal. On either side of it the Godāvari and Kistna pushed their

deltas further and further out into the sea, until the southward extremity of the one joined the northward limit of the other, and the arm of land thus formed cut off the Colair depression from the salt-water. The streams which flow into it now keep its waters fresh, but the silt they carry is rapidly filling it up, and, in the course of time, it will inevitably disappear. During the monsoon it exceeds 100 square miles, but, in the dry weather, it shrinks considerably, and sometimes, as in the drought of 1900, the lake dries up altogether."

The **Tungabhadra** river (400 miles) is formed by the union of the Tunga and Bhadra, which rise together in the western ghāts at Gangāmula in Mysore, and unite at Kudali in the Shimoga district of that State. The river forms the boundary between Mysore and Bombay, Bombay and Madras, and Madras and Hyderabad, and eventually joins the Kistna river near Kurnool. In its course it passes the ruined city of Vijayanagar, amid scenery, of which enormous rocky boulders are the dominant feature. Among other affluents, it receives the Hagari or Vedavati, formed by two rivers called the Veda and Avati, which rise in the Bāba Budan hills in Mysore. In the Chitaldroog district of Mysore, the Hagari supplies the great Mari Kanave reservoir, which has an area of 34 square miles. It finally joins the Tungabhadra at Hālekota. On the Tungabhadra, as on some other rivers, coracles are used for conveying passengers from place to place. Concerning this primitive type of boat, Bishop Whitehead writes that it "corresponds exactly to my idea of the coracle of the ancient Britons. It consists of a very large, round wicker basket, about eight or nine feet in diameter, covered over with leather, and propelled by paddles. As a rule, it spins round and round, but the boatmen can keep it fairly straight, when exhorted to do so. Some straw had been placed in the bottom of the coracle, and we were allowed

the luxury of chairs to sit upon, but it is safer to sit on the straw, as a coracle is generally in a state of unstable equilibrium." The French traveller Tavernier, who visited India in the seventeenth century, wrote (1676) that, on his way to Golconda, "the boats employed in crossing the river are like large baskets, at the bottom of which some faggots are placed, upon which carpets are spread."

The **Penner** river rises on Channarāyan-betta, in the Kolar district of Mysore, and enters the Anantapur district of the Madras Presidency. After passing through the Cuddapah and Nellore districts, it enters the Bay of Bengal below the town of Nellore. In Cuddapah it is joined by the Chitrāvati, and flows through the gorge of Gandikota (gorge fort), which has been described as the most splendid river pass in South India, with the exception of the wild bed of the Kistna, where it cuts its way through the Nallamalai hills. The fort of Gandikota is situated on the top of a hill, 1,670 feet above the sea, overlooking the river. Lower down, the Penner is joined by the Pāpaghni river.

The **Pālar** river (230 miles) is supposed to rise on Nandidroog, in the Kolar district of Mysore. The Betamangala tank, which is supplied by it, is the source of the water-supply for the Kolar gold-fields. The river enters the North Arcot district of the Madras Presidency, and, passing Vellore, Arcot, and Chingleput, reaches the Bay of Bengal near Sadras.

The **Ponnaiyar** river (250 miles) rises on Channarāyan-betta in Mysore, and, entering the Madras Presidency, flows through the Salem and South Arcot districts. It finally reaches the coast at Cuddalore. In the Tamil month Tai, the Ganges is believed to flow into it by an underground passage, and a festival is celebrated on its banks.

The **Vellar** river (135 miles) is formed by the junction of the Vasishtanadi and Swetanadi, which rise in the Salem district, and carry off the drainage of the Pachaimalai,

Kollaimalai, and Kalrayan hills. It constitutes the boundary between the South Arcot and Trichinopoly districts, and reaches the Bay of Bengal at Porto Novo. According to tradition, it reaches the waters of the Coleroon out at sea; and, in the Tamil month Māsi, the idol from the temple at Srīmushnam is taken in procession to the shore opposite the spot, and Hindus bathe in the sea.

The **Cauvery** or Kāveri (475 miles) is sometimes called the Dakshina Ganga, or Ganges of the south. Its divine origin is set forth in the *Kāveri Mahātmya*. Among the Hindu death-rites is the sacred bath for the atonement of sins and purification of the soul, which is called kāveri or samudra snana, according as the dying person is near a river or the sea. The Cauvery rises at Tale-Kāveri on the Brahmagiri hills in Coorg. Near the Coorg frontier it flows past Fraserpet, and enters the Mysore State, passing soon afterwards through a narrow gorge, with a fall which gives rise to the rapids of Chunchankatte. The Kabbani river joins it at Tirumakudlu near Narsipur, and the confluence is regarded as a very sacred spot. In its course through Mysore, the Cauvery forms the islands of Seringapatam and Sivasamudram (sea of Siva). At the latter are the celebrated Cauvery Falls, called the Gagana Chukki (sky spray) and Bhar Chukki (heavy spray), which have been said to far surpass the falls of the Rhine at Schaffhausen in height, volume, and grandeur. In the centre of the Bhar Chukki is a hollow shaped like a horse-shoe, down which the main stream falls. In the rainy season, the Bhar Chukki is about a quarter of a mile broad. On the island of Sivasamudram is the tomb of Pīr Wali, a Muhammadan saint, which is the scene of an annual festival. Below the falls, the river narrows to form the mēke dhātu or goat's leap. At Sivasamudram the Cauvery enters the Madras Presidency, forming the boundary between the Salem and Coimbatore districts, and further on enters the Trichinopoly

Fig. 6. Cauvery Falls, utilised for the development of the hydro-electric power used on the Kolar gold-fields.

district. Near Alambādi in Coimbatore is the smoking rock, so named from a rock which throws up a cloud of spray from the middle of the river. According to native belief, there is a hole or chasm, four palm trees deep, into which the water falls. At the island of Srīrangam, near Trichinopoly, which is about nineteen miles in length, the river divides into two main delta-branches, the Coleroon or Kollidam and Cauvery, which irrigate the fertile delta called the garden of South India. The former enters the Bay of Bengal near Dēvikotta, and the latter shrinks into an insignificant stream.

The chief tributaries of the Cauvery in the Madras Presidency are the Bhavāni, Noyil, and Amaravati. The **Bhavāni**, famous for its mahseer (*Barbus tor*) fishing, which rises in the Attapādi valley in Malabar, is joined by the Moyar, and, flowing past Mettupalaiyam, where it is crossed by the Nīlgiri railway, unites with the Cauvery near the town of Bhavāni. The **Moyar** commences as the Paikāra river, which rises on the slopes of Mūkarti peak on the Nīlgiris, and, flowing past Paikāra, forms the Paikāra falls, and so reaches the Wynaad plateau. Under the name of the Moyar it runs through the Mysore ditch, separating the Nīlgiris from Mysore, and enters the Bhavāni.

The **Vaigai** river rises by two streams, which drain the Kumbam and Varushanad valleys of the Madura district, and receives much of the water from the Palni hills. Passing the town of Madura, it enters the Bay of Bengal about 10 miles east of Rāmnad. Its water-supply has been much increased in recent years by the Periyar Project.

The **Tāmbraparni** river rises on the slopes of Agastyamalai, a conical peak in the Travancore State, and reaches the plains of the Tinnevelly district by the falls of Pāpanāsam (pāpa, sin; nāsam, destruction). This is a very sacred spot, with a Saivite temple, and is visited by large numbers of pilgrims. The fish in the river are fed from the temple

funds. The river finally enters the sea in the Gulf of Manaar. It receives, in its course, the waters of the Chittar river, which forms the Kuttalam or Courtallum falls in the Tenkāsi taluk of the Tinnevelly district. Near the falls is the temple of Kuttālanāthaswāmi, and the spot is regarded as sacred by Hindus, who bathe there.

CHAPTER IV

ISLANDS

THE **Laccadives** (laksha dvīpa, a hundred thousand islands) are a group of coral-reefs and islands (atolls), situated between 10° and 12° N., and 71° 40′ and 74° E., at a distance of about 125 to 200 miles from the Malabar coast. The northern group, called the Amindivi islands, consists of five islands—Chetlat, Kiltan, Kadamat, Amini, and Bitra—which are administered by the Collector of South Canara. The southern group, which comes within the jurisdiction of the Collector of Malabar, is made up of Androth, Kavaratti, Agatti or Akatti, Kalpeni, and the isolated atoll of Minicoy, intermediate between the Laccadives and the Maldive islands further south, which are tributary to the Ceylon Government. For administrative purposes, Professor Stanley Gardiner informs us, the **Maldives** are divided into thirteen provinces, which are called Atolu, each with a governor, the Atoluveri. These provinces are often conterminous with the atolls, whence arose this term. The Laccadive islands are low-lying, and recognisable from the sea by means of the coconut plantations, with which they are covered. They are said to have emerged, in nearly all cases, from the eastern and protected side of the reef, the western side being completely exposed to the south-west

monsoon. The surface coral has been excavated on the principal islands (e.g. Androth and Kalpeni), according to tradition by a race of giants. In the excavations, various food-grains and vegetables are cultivated. For their livelihood, the islanders depend largely on the products of the coconut, which are taken in sailing-boats to the west coast. Great damage is done to the coconut trees by rats, for the extermination of which owls, rat-snakes, and mungooses, have been introduced from time to time. In recent times, periodical kuttams (assemblies) or rat-hunts have been organised, and it is said that the Amīn (headman) has the power of inflicting a fine for non-attendance thereat. The bulk of the population of the Laccadive islands is made up of Muhammadan Māppillas. According to tradition, these Māppillas were originally inhabitants of Malabar—Nambutiri Brahmans, Nāyars, Tiyans, etc.—who went in search of Chēramān Perumāl, king of Malabar, who was converted to the Muhammadan faith and left for Mecca, and were wrecked on the islands. They are divided into castes, of which the highest is represented by the Koyas, who own the coconut trees and boats (odams). The navigating class is represented by the Malumis (pilots), and the lowest class are the Mēlacheris, who carry out the tree-tapping, coconut-plucking, and other menial services. The Koyas are said to be descendants of Nambutiris, the Malumis of Nāyars, and the Mēlacheris of Tiyans and Mukkuvans.

Pāmban (snake) island, on the south-east coast, is said to owe its name to the tortuous, snake-like course of the narrow Pāmban Pass, 1,350 yards in width, which separates it from the mainland. It is recorded by Professor Stanley Gardiner that there are clear indications of a former land connection between India and north Ceylon, the so-called Adam's Bridge, and the islands of Manaar on the Ceylon coast and Pāmban, appearing indubitably to be the remains

of a formerly elevated limestone flat, which has been more or less cut down by the sea to the low-tide level. Tradition runs to the effect that, at the time of the separation of the island from the mainland on the one side, and Ceylon on the other, the cows became prisoners on it, took to living on sea-weeds, and became converted into diminutive metamorphosed cows, which may still be seen grazing on the shore. The legend is based on the fancied resemblance of the horned coffer-fishes (*Ostracion cornutus*), which are frequently caught in the fishing-nets, to cattle. The island, which is about eleven miles long by six wide at its widest part, narrows towards the eastern end, where a strip of

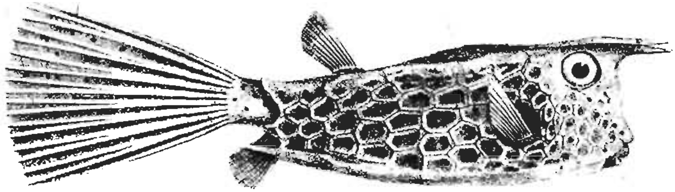

Fig. 7. *Ostracion cornutus.*

sand, with wind-blown sand-dunes, runs down to a point towards Adam's Bridge. On the west side of the Pāmban Pass is the Great Dam, consisting of large masses of sandstone, all having a more or less flat surface, which are said to have once formed part of the causeway extending across to the mainland. The remains of this causeway are still visible on the road leading across the island from the town of Pāmban to Rāmēsvaram. This sacred place is visited, on account of its temple, by huge numbers of pilgrims from all parts of India, who go through a course of ceremonies and ablutions in the sea under the direction of

a priest, and deposit coins and clay images therein. The population of Pāmban is largely made up of boatmen and fishermen, some of whom find employment in ferrying pilgrims from the mainland to the island. Coolies are engaged in warping vessels through the Pass, when the wind is adverse. The north coast of the island is fringed by a coral-reef. In the extension of the reef-band towards Rāmēsvaram appears a limestone, consisting entirely of calcareous algæ (*Lithothamnium*), with a few scattered

Fig. 8. Sub-fossil Coral Reef, Pāmban.

coral masses. Near Pāmban, a sub-fossil reef, largely composed of enormous blocks of *Porites*, forms a miniature cliff, several feet in height, above high-tide mark. Some years ago masses of pumice were heaped up on the shore near this reef. The pumice was no doubt discharged from the volcano of Krakatoa in the Straits of Sunda, during the great eruption of 1883, and drifted by currents across the ocean. South of the Pāmban Pass are a series of little coral islands (Pulli, Pullivausel, Coorisuddy, etc.), which

form a natural breakwater, protecting the Pass and channels leading to it from the violence of the south-west winds. The South India Railway Company is at the present time building a viaduct across the Pāmban Pass, with an opening for vessels by means of a Scherzer lifting bridge. The railway line goes across the island to the extreme point at Dhanushkodi, and arrangements are being made for a steamer service to Talemanaar in Ceylon.

The low and swampy **Hope Island**, situated near one of the mouths of the Godāvari river, is covered with low jungle, and to a great extent submerged during high tides.

The coral-girt island, called **Hare Island**, outside which steamers anchor, is situated 2½ miles from Tuticorin. Hares and partridges may be shot on it, and sluggish holothurians (bêches-de-mer) collected in abundance at low-tide.

Srīharikota is a low-lying alluvial island, 35 miles long, off the Nellore coast, bounded on the east by the Bay of Bengal, and on the west by Pulicat lake. On the north it is separated from the mainland by a narrow channel. It is covered with jungle, and affords an important source of supply of fuel for firewood, which is transported to Madras by the Buckingham Canal. The island is the head-quarters of the jungle Yānādis, who are expert sportsmen and trackers (shikāris), and collect minor forest produce for the Forest Department.

The alluvial deposit, which forms the island of **Vypeen** on the west coast, 14¾ miles in length, is bounded on the west by the Arabian Sea, and cut off from the land on the north, south, and east, by the mouths of the Cranganore and Cochin rivers, and the backwater. According to tradition, the island was thrown up in 1341 A.D., and, from that time, a new era, called the Pudu Veppu, or era of the new bank, began. The suggestion has been made that the name Pudu Veppu may commemorate the establishment

of the first Christian church on the island, or the date when it first became cultivatable. The spot possesses considerable historic interest. "Cranganore (Kudangalur) has been confidently identified with the Musiris of the ancients, the greatest emporium of India according to Pliny the Elder, which stood on a river two miles from its mouth according to the *Periplus Maris Erythræi*, the river being known as the Pseudostomos or False Mouth, a correct translation of Alimukam, as the mouth of the Periyar is still called."

The island, known as **Sacrifice Rock**, situated about eight miles out at sea, to the north of Quilandi in Malabar, is probably the white island of the *Periplus Maris Erythræi*, and is still called Velliyan Kallu, or white rock, owing to the deposit of white excrement (guano) of birds on it. It is said to have received the name of Sacrifice Rock, because the Kottakkal Kunhāli Marakkar pirates slaughtered the crew of a Portuguese vessel there, or according to another version, because Haidar Ali left state prisoners and others there, to die of hunger and thirst. The naturalist Jerdon found on the island a cave, which contained a large number of nests of the edible-nest swiftlet (*Collocalia fuciphaga*), which are made of grass, moss, and feathers, cemented together by inspissated saliva.

The **Daryā Bahādurgarh island** shelters the roadstead off Malpe in South Canara. A few miles further north is **St Mary's Island**, which is so called because Vasco da Gama is said to have put up a cross on it, when he landed there in 1498. The islets opposite to the mouth of the inlet of the sea at Mulki in South Canara are known as the **Mulki Rocks**.

CHAPTER V

SEAPORTS ; MARITIME TRADE

THE most important ports from north to south are: (*a*) on the east coast, Gopalpur, Calingapatam, Bimlipatam, Vizagapatam, Cocanāda, Masulipatam, Madras, Pondicherry, Cuddalore, Kārikāl, Negapatam, Pāmban, and Tuticorin; (*b*) on the west coast, Mangalore, Cannanore, Tellicherry, Calicut, Cochin, Alleppey, Quilon, and Kolachel.

There is, in South India, no natural harbour to serve as a haven for ocean-going steamers during stormy weather. The maritime trade is mainly conducted from open roadsteads, where big ships lie at anchor, sometimes at a distance of several miles from the shore. On the west coast, the ports are more or less closed to shipping during the rough weather of the south-west monsoon.

The oily **mud-banks of Alleppey and Nārakkal** on the Travancore-Cochin coast afford smooth-water anchorage for ships during the south-west monsoon, waves passing over the banks being diminished in height, and lessened in velocity. Dr W. King was of opinion that the oil in the mud is derived from the decomposition of organisms, and a distillation of oil in the subjacent lignitiferous deposits belonging to the Warkilli strata. Sometimes the mud-bank of Nārakkal is heaped against the shore, and a channel has to be cut to enable boats to reach the sea. At times the mud deposits appear out at sea, rising to a height of three or four feet. It has been shown by Messrs Rohde and

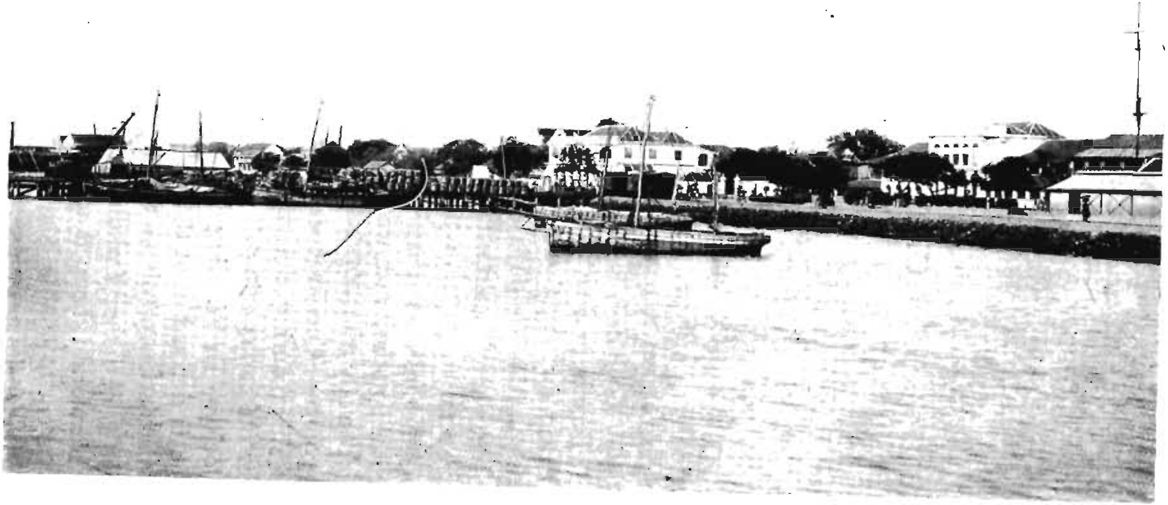

Fig. 9. The sea-front, Tuticorin.

Crawford: (*a*) that, when the backwaters of Alleppey, which open into the sea, rise, the extent of the smooth-water tract increases, and mud "volcanoes" burst into the sea; (*b*) that the mud-bank at Alleppey is formed at intervals, and is gradually washed southward by littoral currents, and slowly dissipated by the waves. Usually, before the old bank has disappeared, a new one starts. Sometimes, for several miles down the coast, and from the beach out to sea for a mile and a half, the sea is nothing but liquid mud, which gives rise to a heavy mortality among the fishes. It has been assumed by Mr P. Lake that, under the sand of Alleppey, is a layer of mud which crops out under the sea. When the backwater rises to any height, the pressure forces the mud out under the sea, and forms the mud-bank. The Nārakkal mud-bank is, according to Mr Lake, probably to a large extent formed of the silt carried down by the Cranganore river.

Cargo is, at many ports, conveyed from ships in light boats capable of passing through the surf which breaks on the sandy shore. The present day **masula** (or mussoola) boat of the Madras coast is of the same build now as it was several centuries ago. It was recorded by a traveller in 1673 that he "went ashore in a Mussoola, a boat wherein ten men paddle, the two aftermost of which are the Steersmen, using their paddles instead of a Rudder. The Boat is not strengthened with knee-timbers as ours are; the bended Planks are sewed together with Rope-yarn of the Cocoe, and calked with Dammar so artificially that it yields to every ambitious surf. Otherwise it could not get ashore, the Bar knocking in pieces all that are inflexible." The archives of Madras contain repeated references to Europeans being thrown violently on shore, or drowned from the overturning of masula boats in the surf, through which a landing had to be effected before the Madras pier was built. It is recorded in the Fort St George Consultations, 1679, that

"a mussoollee being overturned, although it was very smooth water, and no surf, and one Englishman being drowned, a Dutchman being with difficulty recovered, the boatmen were seized and put in prison, one escaping."

The screw-pile pier at **Madras** was completed in 1862. The stone commemorating the commencement of the harbour was laid by the Prince of Wales (afterwards King Edward VII) in 1875. The harbour, when completed, consisted of two parallel masonry breakwaters, each 500 yards distant from the pier, running out at right angles to the shore for 1200 yards into 7½ fathoms of water, and bending towards each other, so as to leave an opening 500 feet wide in the centre of the east side for the ingress and egress of ships. Quite recently, a new north-east entrance has been made, and was first used, in the presence of the Viceroy, in 1909. The old east entrance, which was rapidly shallowing owing to silting of sand, has since been permanently closed.

Proposals have long been under consideration for the construction of a harbour at **Vizagapatam**, where the tidal backwater is sheltered on the south by the headland of Dolphin's Nose and the hills behind it, and on the other side by distant hills. The conclusion arrived at by an expert was that a groin from the end of Dolphin's Nose would stop the formation of the sand-bar, produced by the waves acting on the sand from the south, which stretches across the entrance to the backwater. At Vizagapatam, a Muhammadan saint is buried on the top of the hill overlooking the backwater. He is considered to have great power over the waters of the Bay of Bengal, and silver dhonis (native vessels) are offered at his shrine by Hindu shipowners after a successful voyage.

Proposals have also been under consideration to cut a ship-canal through **Pāmban island**, to obviate the necessity of large steamers, which are making for ports along the east coast, going out of their way round Ceylon. A channel,

which is used by small coasting steamers, has been artificially produced by deepening the Pāmban Pass, which separates the island from the mainland of the Rāmnād district.

The extensive **backwater of Cochin**, which covers an area of several square miles, is connected with the sea by the mouth of the Cochin river. Along the river-banks are ranged rows of fishing nets, called "Chinese nets," which

Fig. 10. Dolphin's Nose, Vizagapatam.

are worked from wood and bamboo platforms or jetties. The backwater affords safe anchorage for vessels of light draught, but the bar, which is about a mile from the shore, presents an obstacle to the passage of big ships.

Emigration takes place from various ports on the east coast, e.g. Tuticorin, Negapatam, Kārikāl, Madras, and Cocanāda, to Natal, Fiji, the Straits Settlements, the French colonies, Ceylon, and Burma. It is said that the mail

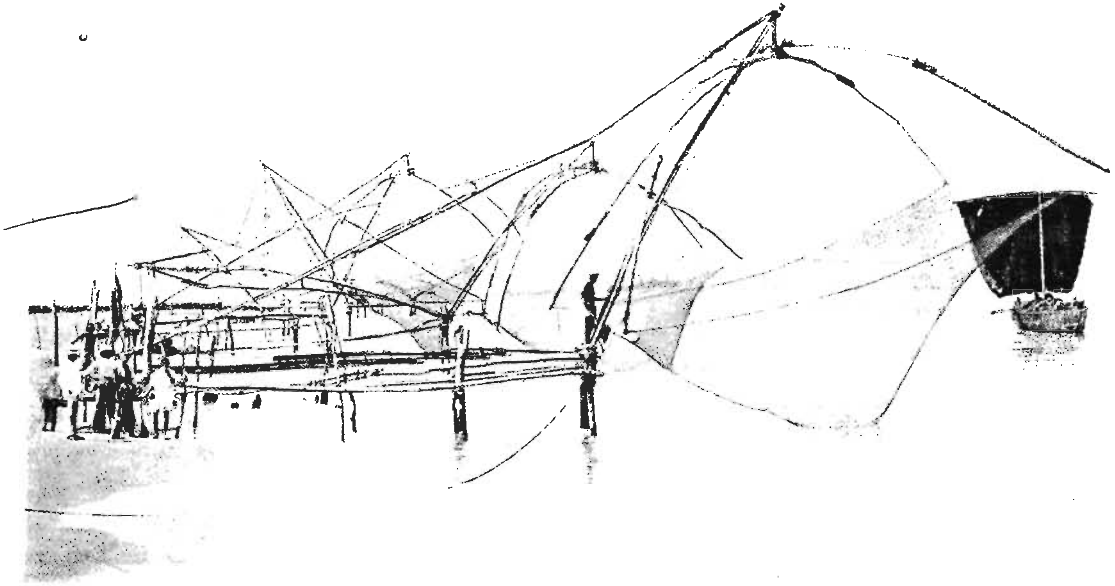

Fig. 11. Fishing nets, Cochin.

steamers to Rangoon carry consignments of stone and metal idols, commissioned by the South Indian settlers in Burma for the purpose of domestic and public worship.

Nearly half the **maritime trade** is conducted from the port of Madras, which is followed in order of importance by Tuticorin—the terminus of the South India Railway—and Cochin.

Exports of the Principal Articles, 1910—11.

		Rs
Cotton, raw		4,14,18,843
Hides and Skins ...		3,75,29,684
Seeds	Castor, cotton, ground-nut, niger, gingelly, coriander, etc. ...	2,51,56,746
Grains and Pulses ...	Rice, 99 per cent.	1,42,19,442
Coffee		1,31,24,107
Tea		1,22,89,442
Cotton manufactures		1,03,98,593
Fruits	Chiefly coconut kernels or copra	92,58,731
Coir	Coconut fibre and matting ...	68,69,887
Spices	Pepper, ginger, chillies, etc. ...	52,63,729
Oils	Chiefly coconut oil, also castor, ground-nut, and lemon-grass...	41,83,505
Cotton twist and yarn		23,00,612
Drugs, medicines, and narcotics	Leaf tobacco, cigars, senna leaves, nux-vomica, etc.	17,49,569
Timber	Sandalwood, blackwood or rosewood, teak, etc.	17,32,606
Bristles and fibres for brushes	Mainly palmyra palm fibre ...	15,22,650
Dyeing and tanning materials	Indigo, turmeric, myrabolams, etc.	12,33,574
Sugar		11,82,255
Rubber	Exports 1909--10, Rs 1,95,120...	8,13,435
Silk, raw		2,29,703

Value of Exports to the principal countries outside India, 1910—11.

	Lakhs of Rupees
British Empire	620.82
Ceylon	358.31
France	305.41
Germany	174.47
Japan	145.43
Belgium	121.41
Straits Settlements ...	91.61
United States of America	69.98

CHAPTER VI

CLIMATE

CLIMATE has been defined as the average condition of the atmosphere, while weather denotes a single circumstance, or event, in the series of conditions. The climate of a place is thus in a sense its average weather. Two types of climate have been described as occurring in the Indian Peninsula, viz. (*a*) continental, which prevails, except in certain coast districts, from December to May, and is characterised by the prevalence of land winds, dry air, and large diurnal range of temperature; (*b*) oceanic, from June to December, with a smaller diurnal range of temperature, dampness of the air, and more or less frequent rain.

The climate of the southern districts of the Madras Presidency has been not inaptly summed up as being three months hot, and nine months hotter. As shown by the table, the mean temperature of the city of Madras is 89·6° F. during the hot month of May, and 76·2° F. in the "cold weather" month of January.

The chief types of weather, and the periods during which they prevail in Madras and the Carnatic, have been classified as follows:

(1) "Cold weather"—from the end of December to the end of February;

(2) Hot weather—from the beginning of March to the end of May;

(3) South-west monsoon—from the beginning of June to the first week in October;

(4) North-east monsoon—from the second week in October to the third week in December.

Temperatures recorded at ten stations.

Station	Height in feet above sea-level	Mean Temperature in Degrees Fahrenheit			
		January	May	July	November
Vizagapatam (Waltair)	226	74·9	86·7	84·8	78·5
Cocanāda	26	73·8	91·4	85·4	77·0
Nellore	71	76·6	93·9	88·6	79·1
Cuddapah	433	76·8	94·6	86·6	78·6
Madras	22	76·2	89·6	87·3	76·7
Madura	447	78·3	88·8	84·8	80·0
Coimbatore	1,348	75·6	84·3	79·4	77·6
Calicut	27	78·7	84·2	78·2	80·4
Trivandrum (Travancore)	198	77·5	81·6	77·6	77·6
Wellington	6,200	56·5	67·1	64·5	59·6

The word **monsoon** is derived from the Arabic mausim, meaning season, which was corrupted by the Portuguese into monĉao, and by the Dutch into monssoyn or monssoen. The monsoons have been summed up as winds which blow alternately in opposite directions, and at opposite seasons of the year, i.e. blowing over the land from the Arabian Sea in the south-west, and from the Bay of Bengal in the north-east monsoon.

During the "**cold weather**," the hottest area is in the southern districts of Trichinopoly, Madura, and Tinnevelly, and the coolest areas in the plains are in the three northern districts, Ganjam, Vizagapatam, and Godāvari, and in Bellary, Anantapur, and Kurnool. At Ootacamund (7,000

feet above sea-level), on the Nīlgiri hills, and even at Wellington, nearly a thousand feet lower, light frosts occur in the cold months. Sometimes, in the early morning, the valleys and hollows of the hills are covered with hoar-frost.

In January, showers fall, which are called **Pongal showers**, in reference to the Pongal (boiled rice) or Sankranti festival observed by Hindus on the first day of the month of Tai, commencing approximately on the 12th January, when Hindus offer boiled rice and milk to propitiate the sun-god. The showers which fall in March and April are called **blossom showers** in the coffee-growing areas, and elsewhere mango showers, because they occur at the time when the mangoes are commencing to ripen.

During March and April, the damp and enervating "**long shore" winds** blow from the south along the Madras coast. They are said to derive some of their moisture from having to pass through miles of space filled with fine spray thrown up into the air by the heavy surf that breaks on the coast at this season. These winds have been described by the author of *Letters from Madras* (1843), as "very disagreeable—a sham sea-breeze blowing from the south, whereas the real sea-breezes blow from the east. It is a regular cheat for the new-comer, feeling damp and fresh, as if it was going to cool them." The true sea-breeze is one which blows from the cool sea towards the heated land in the afternoon and evening, whereas the land wind blows from the cooled land to the warmer sea in the morning.

During the **hot weather**, the hottest areas are the Ceded districts and the Deccan. Cuddapah takes rank as the hottest station in the Madras Presidency, with a mean temperature of 94·6° F. in May. The four Deccan districts —Cuddapah, Kurnool, Bellary, and Anantapur—which are in the dry zone, where the rainfall is slight, suffer more from famine than any others.

The hot weather is varied, especially in and near the hills, by thunderstorms, which, in the plains, are preceded by strong wind and clouds of dust. In May depressions sometimes form in the Bay of Bengal, and storms strike the coast.

With the commencement of the **south-west monsoon**—commonly called "the rains"—which, under normal conditions, "bursts" during the first fortnight in June, the temperature falls on the west coast. The monsoon current strikes the coast almost at right angles, and discharges a very large quantity of rain in the plains between the Arabian Sea and the western ghāts, and on the face of the ghāts. The amount is, however, slight as compared with that which falls at Cherrapunji in Assam, where the annual rainfall is 400—500 inches. At Karkal, in South Canara, which is near the ghāts, the average rainfall is 189 inches, and 239 inches were registered in 1897. Devāla, in the Wynaad, averages 161 inches. At Mercāra, in Coorg, the average fall is 133 inches, of which 42 inches fall in July. At Naduvatam, which is situated at the western extremity of the Nīlgiri plateau, the average fall is 102 inches. At Ootacamund, which is some miles eastward of the ghāts, and only 20 miles distant from Naduvatam by road, and much nearer as the crow flies, the rainfall averages only 49 inches. Further east, at Coonoor, which receives its share of both the south-west and north-east monsoons, the average rainfall is 63 inches. During the south-west monsoon, the periods of strong wind and heavy rain are separated by spells of fine weather, which are commonly known as breaks in the rains. In the plains of Tinnevelly, in the extreme south of the Peninsula, the south-west monsoon brings strong winds to the eastern side of the ghāts, which blow great clouds of red dust, fifty or sixty feet high, from the plains towards the sea on the east coast.

The south-west monsoon ceases towards the end of

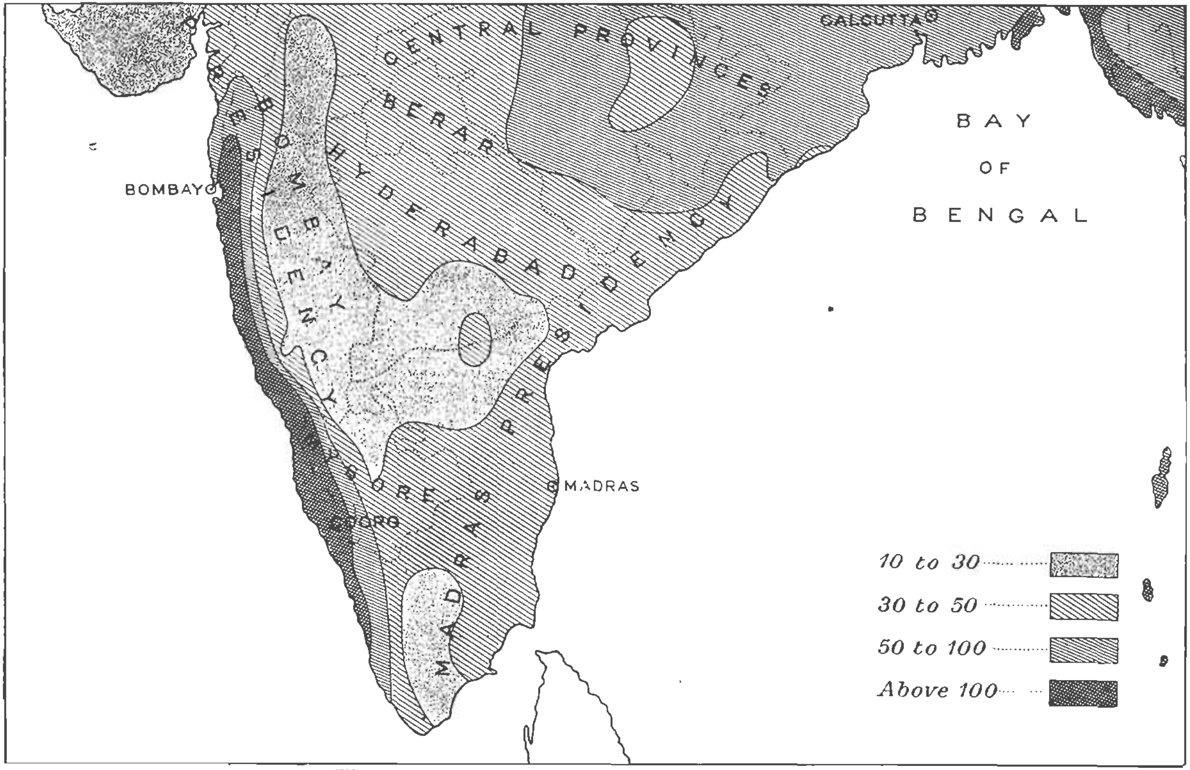

Fig. 12. Average Annual Distribution of Rainfall.

September. With its cessation, humidity is high, and there is an absence of breeze on the Madras coast, until the arrival of the north-east monsoon rains, which are due about the middle of October. With the "burst" of the monsoon, the temperature drops suddenly. The rainfall is greatest along that part of the coast which lies between Pulicat lake and Point Calimere. But the annual rainfall is, as shown by the following statistics, far less on the east than on the west coast:

		Average annual rainfall, in inches
Vizagapatam,	east coast	49·27
Cocanāda	,, ,,	40·95
Madras	,, ,,	50·51
Calicut	west coast	118·81
Hosdrug	,, ,,	127
Coondapoor	,, ,,	141

The weather conditions over the Bay of Bengal during the **north-east monsoon** favours the formation of cyclones, the position and course of which determine the distribution of the rainfall. A cyclone (*κυκλῶν*, whirling, from *κύκλος*, a circle) has been defined as "an atmospheric system, where the pressure is lowest in the centre. The winds in consequence tend to blow towards the centre, but, being diverted, according to Ferrel's law, they rotate spirally inwards in a direction contrary to the movement of the hands of a watch in the northern hemisphere, and the reverse in the southern hemisphere. The whole system has a motion of translation, being usually carried forward with the great wind drifts, like eddies upon a swift stream." The north-east monsoon cyclones as a rule fill up rapidly after passing inland from the coast, and rarely cross the peninsula to the Arabian Sea. In 1886, however, a storm, after it had done so, developed again into a severe cyclone.

During a cyclone, in October 1746, when La Bourdonnais' fleet was off Madras, after the town had surrendered

to the French, three of his ships and two prizes sank, and 1,200 men were drowned. In 1782, more than a hundred native craft, which had brought supplies of rice to Madras for the thousands who had taken shelter there from Haidar

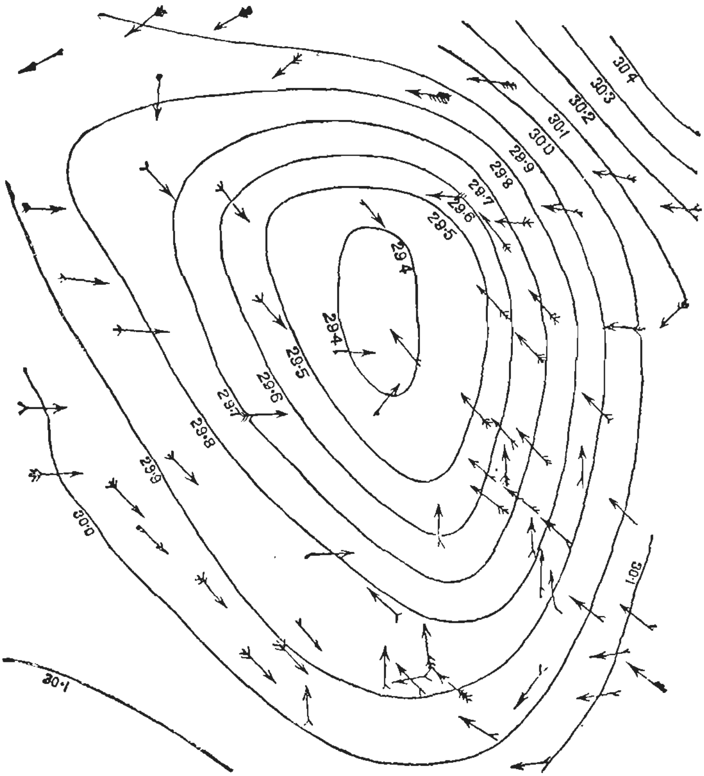

Fig. 13. Chart showing diminishing pressure from the outskirts to the centre of a cyclonic storm.

Ali's horsemen, were wrecked. During a cyclone, which struck Masulipatam in November 1864, a storm wave, thirteen feet above ordinary high-tide level, was borne inland seventeen miles from the coast. A man who clung

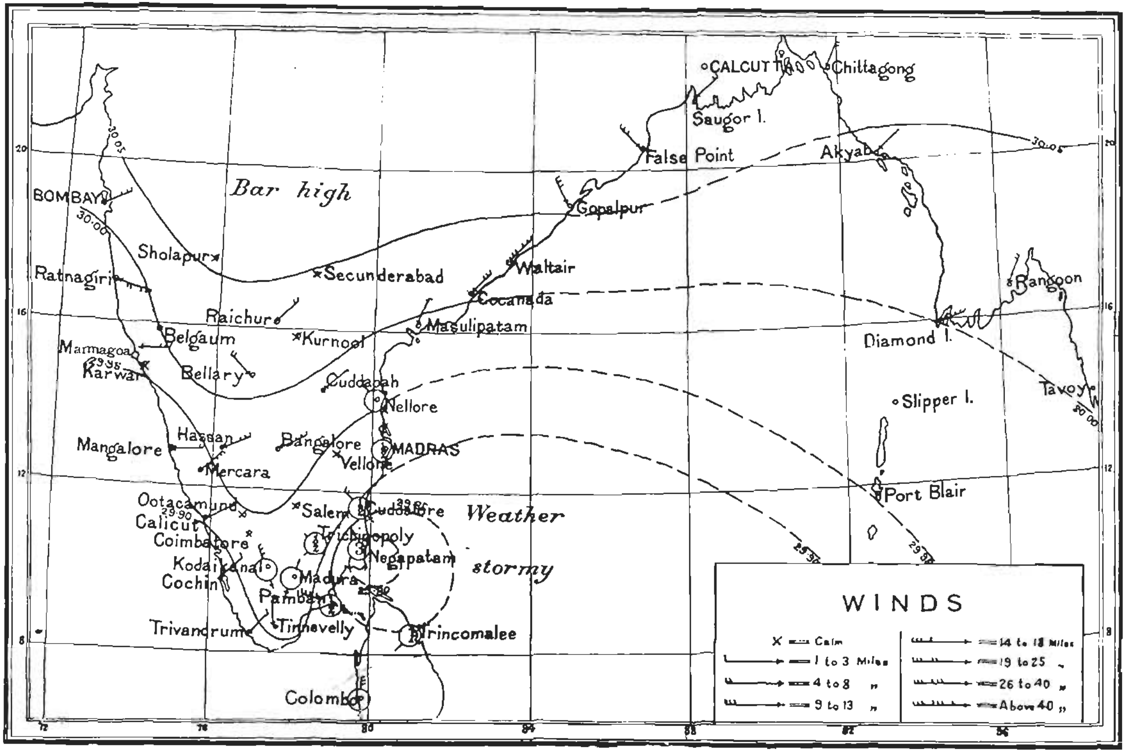

Fig. 14. Chart of Cyclonic Storm.

Rainfall recorded at ten stations.

Station	Average rainfall in inches for 25 years, ending 1901												
	January	February	March	April	May	June	July	August	September	October	November	December	Total of year
Waltair (Vizagapatam)	0·32	0·41	0·36	0·59	2·88	3·69	4·45	5·05	7·90	9·85	5·87	1·60	42·97
Cocanāda	0·14	0·51	0·43	0·49	1·96	4·21	5·81	5·86	6·19	8·87	5·59	0·89	40·95
Nellore	0·38	0·09	0·17	0·32	1·33	1·31	2·31	3·01	3·83	9·01	11·71	2·82	36·29
Cuddapah	0·15	0·17	0·12	0·52	1·75	3·14	4·04	5·80	6·12	5·51	3·71	1·06	32·09
Madras	0·50	0·31	0·18	0·48	1·64	2·12	3·91	5·13	4·93	11·14	13·97	6·20	50·51
Madura	0·26	0·48	0·50	2·36	2·86	1·22	1·94	3·61	5·22	8·53	4·78	2·16	33·92
Coimbatore	0·38	0·43	0·46	1·76	2·21	1·75	1·15	1·12	1·53	6·29	3·44	1·17	21·69
Calicut	0·18	0·16	0·57	4·28	9·74	35·77	27·91	16·32	7·67	10·50	4·66	1·05	118·81
Trivandrum (Travancore)	0·43	1·01	1·48	4·98	5·59	12·58	6·48	3·64	2·78	11·02	6·02	2·47	58·48
Wellington	1·05	1·44	2·39	3·59	3·66	3·47	3·48	3·97	5·71	11·06	6·89	3·94	50·65

first to a palmyra beam, and afterwards to a boat, was carried fourteen miles inland. Casks of beer and arrack from the Commissariat godown (warehouse) strewed the country for miles around. Dead bodies lay along the limit of the inundation, as sea-weed lies on a shore at high-water mark. At the crossings of the principal streets, the dead lay in heaps. Graves were dug, and the bodies thrown in —in one case ten men and a bullock in one grave. Some of the bodies were unearthed and eaten by herds of swine, and packs of marauding pariah dogs. Others were exhumed and cremated, when a supply of dry firewood was available. The loss of life was estimated at 30,000, and there was great destruction of cattle. In May 1872, nine English ships, with an aggregate tonnage of 6,700 tons, and twenty native craft, were driven ashore at Madras. During a storm at Vizagapatam, in October 1876, the new iron dome of Mr Narasinga Rao's Observatory, which had not been rivetted down, was carried 33 feet. A cyclone, which struck Madras in November 1881, knocked over two Titan cranes, which were being used in connection with the harbour works, and washed away half a mile of the break-water.

Daily records of the atmospheric pressure, direction of the wind, temperature, humidity, and rainfall, in the southern half of the Peninsula, and round the Bay of Bengal (including Burma and the Andamans), are issued by the Government Meteorologist in Madras.

CHAPTER VII

GEOLOGY

QUITE nine-tenths of the area under consideration consists of an assemblage of crystalline rocks, similar to those which form the "basement complex" in many parts of the world. These rocks, being older than any known fossiliferous or known unaltered sedimentary rocks, are generally referred to as Archæan (*archaios*, ancient; *arche*, beginning). Resting on the weathered surface of these very ancient crystalline rocks there lie patches of unaltered sedimentary formations of different ages. The oldest of these occupy a considerable area in the Cuddapah and Kurnool districts. Similar strips of rocks very much younger than those of Cuddapah and Kurnool are preserved at different places along the Coromandel margin of the Madras Presidency, as for instance in the Trichinopoly district, near Pondicherry, around Madras, and at Rājahmundry. There are also one or two very small patches of still younger marine rocks preserved on the Cochin-Travancore coast. Over all the formations—ancient crystalline basement, superimposed unfossiliferous sedimentary rocks, and geologically more recent fossiliferous formations—there lies a great mantle of modern laterite, with other decomposition products and cultivated soil.

The Madras Presidency is a part of the old land surface of Peninsular India, which has remained stable and undisturbed for untold geological ages. Except near the margins, there are no signs of the rocks having ever been depressed below sea-level; no marine formations are

preserved anywhere in this area, except at the places referred to above near the present sea-coast. As a consequence of this geological stability, and long-continued exposure to the erosive action of the weather, the physical inequalities which give that form of simple relief know as scenery are due merely to unequal resistance to weathering agents.

The **Archæan complex** is composed of a great variety of very ancient igneous and sedimentary rocks, which have been in many cases so altered by heat and earth movements that it is now difficult in many cases to distinguish those which were originally laid down as sediments in water from those which were injected in a molten condition into pre-existing solid parts of the Earth's crust. All the rocks of this group have been buried at some time in their history to great depths in the Earth's crust, and have since been brought to the surface by the continued erosion of the overlying cover. They show a general disposition of their constituent minerals in bands and streaks, roughly imitating the fluidal structures of semi-molten and viscous bodies, which is due to the fact that they have been moulded under enormous pressure and at high temperatures in an early stage of the Earth's history. The rocks now exposed at the surface in Madras therefore form a sample of the kind of materials that still exist at depths in the Earth's crust so great that the pressure due to the overlying masses is sufficient to mould and knead like wax the strongest rock known. There is no direct proof that these folded or banded rocks in Madras, commonly known as gneisses and schists, are similar in age to the formations described as Archæan in Europe and America. They are, however, referred to the Archæan era, because, throughout Peninsular India, as in other parts of the world, they underlie all other geological formations, and form a platform on which all later geological deposits were laid down. Among the constituents of this complex are great masses of ancient

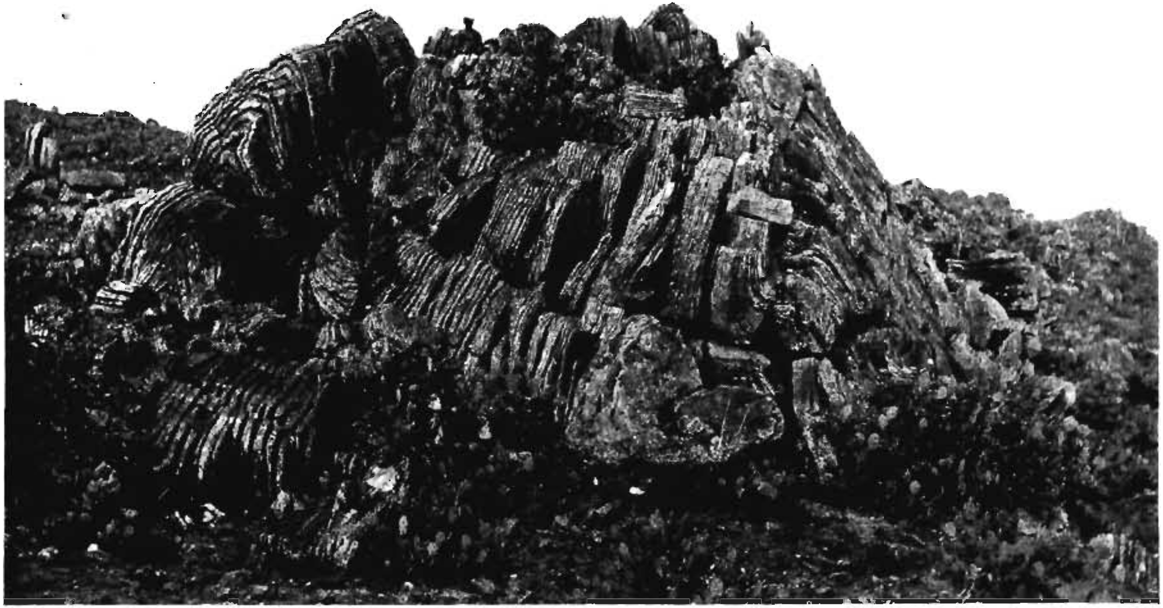

Fig. 15. Foliation of Gneiss, Madakarai, Coimbatore district.

granites, now exposed over large areas in the Mysore State, and in the adjoining districts of Salem, North Arcot, and Bellary. These rocks, being compact and uniform in character, resist the weather more perfectly than the more complex gneisses and schists around. They consequently form conspicuous hillocks, standing up abruptly above the general level of the plains. Many of these, on account of their steep and difficultly accessible slopes, have been

Fig. 16. Characteristic hillock of Granitic Gneiss, Salem district.

utilised in past times as forts and strongholds (drūgs), such for example as that on which the old fort stands at Trichinopoly, Sankaridrūg in the Salem district, and Nandidrūg in the Mysore State.

Another prevalent type among these ancient crystalline formations is a group of rocks similar to granite in having been intruded in the igneous condition, but distinguished from all other rocks of the same class under the name

Fig. 17. The Lake, Ootacamund. An example of the artificial lakes formed on the undulating plateaux of Charnockite rocks.

charnockite series. These rocks have been so named because the material originally described was quarried for the tombstone of Job Charnock, and others of the early English settlers in Bengal. The charnockite series forms St Thomas' Mount near Madras, and other small hills further south in the Chingleput district. The same series of rocks form the Shevaroy hills, the great mountain masses known as the Nīlgiris, and the range of hills trending south from the Nīlgiris through the Malabar district, as well as the States of Cochin and Travancore, rising again above the sea-level to form the great central mass of Ceylon. The characteristic feature of these masses of charnockite is the formation of large plateau-like masses with undulating surfaces of a kind which permits, with slight artificial help, the formation of lakes, such as that near Yercaud on the Shevaroys, that of Ootacamund on the Nīlgiris, Kodaikānal on the Palnis, and at Newara-Eliya in Ceylon. Some of these plateaux stand at elevations of 7000 to 8000 feet, where the climate and the vegetation are of a kind familiar to people who live in temperate climates. Thus, on the Nīlgiri plateau, the undulating "downs" are covered with turf, and in places there occur well-developed peat-bogs, sometimes thick enough to be worked for supplies of fuel.

Among the almost endless varieties of rocks forming the rest of the crystalline complex, we have those which include the deposits of corundum, steatite, and potstone; the veins of coarse-grained granite or so-called pegmatite, which carry marketable mica, and similar veins which have yielded aquamarine in the Coimbatore district.

Associated with the crystalline complex, there occurs a group of rocks which are separately distinguished as the **Dharwar system** on account of their exposure in the district of Dharwar on the north-western border of the Mysore State. The Dharwar system is composed of an assemblage of altered rocks of various origins, some of them very

Fig. 18. Nīlgiri Downs, showing the characteristic scenery on the plateau-masses of the Charnockite series.

ancient sediments, others volcanic lava flows, and others intrusive igneous rocks, all greatly folded by earth movements, and altered by heat and pressure. They are important, because they are sometimes traversed by veins carrying valuable metalliferous deposits, especially of gold and copper. The important gold mines of the Mysore State are worked in a patch of the Dharwar formation.

The strata which cover such large areas in the Cuddapah

Fig. 19. **Cuddapah limestone, Kolab river, showing the honeycomb weathering and general flat-bedded disposition.**

and Kurnool districts are utterly different in character to those which have been grouped together under the name Archæan. They include ordinary sandstones, shales and limestones, which have been in places disturbed by earth movements, and have consequently been slightly folded, but they nowhere show signs of having been deeply buried in the Earth's crust, and are therefore practically unaltered. They are of a kind that might very well have been laid

down as deposits in the sea, yet they are entirely devoid of all forms of organic remains. This absence of fossils may possibly be due to the fact that the **Cuddapah** and **Kurnool formations** were laid down at a period in the Earth's history even older than that of the oldest of known fossiliferous deposits, possibly at a time when animals possessed no hard structures suitable for preservation as fossils. On account of the supposed great age of these formations in India, they have been grouped together under the name **Purāna**, a term which not only indicates the fact that they are very much older than our familiar fossiliferous formations, but also suggests that they are very much younger than the Archæan schists and gneisses on which the Cuddapah and Kurnool sediments rest; for, whilst the Purānas are reckoned as old among Hindu literature, they are in effect the reconstituted products of the still more ancient Vēdas.

There is another great gap in the geological record between the time during which the Cuddapah and Kurnool formations were laid down, and the period in which the next succeeding deposits were formed. These latter form a part of the **Gondwāna system**, which is more conspicuously developed in the northern portions of Peninsular India, where it includes the most valuable coal seams in the country. In the Madras Presidency the only representatives of the Gondwāna system are small patches of shales and sandstones preserved in the Trichinopoly district, near Madras, in various parts of the Nellore district, and near the Godāvari delta. The Gondwāna system, where fully developed in North Peninsular India, is divided into two portions, the lower of which contains the principal coal seams, while the upper division, composed largely of sandstones and shales, is practically devoid of valuable coal. It is the upper division which is mainly represented along the east coast. Most of the rocks belonging to this

system were laid down in great river valleys, but the patches of the upper division preserved near the Coromandel coast show by the fossils they contain estuarine and marine conditions of deposit. The lower coal-bearing division has been proved by borings to occur in the Godāvari district, and is worked in the adjoining parts of the Nizam's Dominions. The Gondwāna system includes rocks which range in age from those formed at about the same time as the Coal Measures in Europe to those which immediately preceded the English Chalk. In the Madras Presidency, near Pondicherry, as well as in the Trichinopoly district, there occur small patches of marine rocks of the Chalk period. These marine Cretaceous rocks were formed, not in the deep sea, but near the shore, and they, with the small areas of marine Gondwāna rocks further north along the Coromandel coast, form the only records of the sea having made a serious inroad on the land in Southern India. Throughout a protracted geological era, India was connected with Central and South Africa, to form a great continent, which was separated from northern lands by an ocean then stretching across Central Europe and Asia. The northern shore-line of this continent, known to geologists as **Gondwānaland**, was approximately along the line now occupied by the Central Himalayan snow-covered peaks, while the position of the south-eastern shore-line is indicated by the small patches of Gondwāna and Cretaceous formations preserved along the Coromandel coast. Whilst, therefore, great geological changes have occurred in the north, very little change has occurred in the shore-line of the eastern coast, and Peninsular India, like Central and South Africa, has remained firm, while other areas were being profoundly altered by the crumpling of the Earth's crust.

The **Cretaceous beds** of the Trichinopoly and Pondicherry areas are specially interesting on account of the great numbers of fossils which they contain, including

many species of world-wide distribution, having been found in similar rocks in Africa, Europe, Brazil, the United States, British Columbia, Japan, and Australia. Of these, mention may be made of such well-known species as *Schloenbachia inflata*, *Acanthoceras rhotomagense*, and *Pachydiscus gollevillensis*, which are forms of the extinct class of coiled-shell

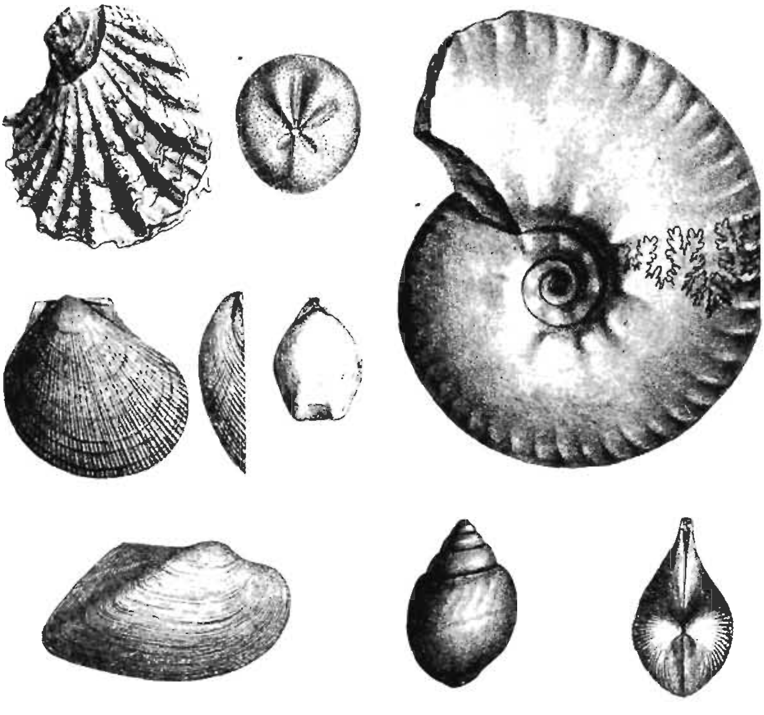

Fig. 20. Cretaceous Fossils.

animals known as Ammonites; various gastropod mollusca like *Turrilites costatus*, and a gigantic form of *Cerithium* often referred to as *Nerinea*; lamellibranch molluscs, especially those related to the oyster family, like *Alectryonia carinata*, *Inoceramus labiatus*, *Trigonoarca galdrina*,

of laterite in India might ultimately prove to be of commercial value as sources of the metal aluminium. They, however, differ greatly in quality from place to place, and in many cases have been mixed up with other detrital material.

The fragmentary nature of the record of geological history in the Madras Presidency is shown by comparing the following list of formations with the table of European systems of strata.

Laterite and modern alluvium, beaches and coral banks	Recent	
Cuddalore sandstones and Warkalli beds ...	Pleistocene Pliocene Miocence Oligocene Eocene	Tertiary
Trichinopoly and Pondicherry formations ...	Cretaceous	Mesozoic
Gondwāna system	Jurassic Triassic	Mesozoic
Not represented in Southern India	Permian Carboniferous Devonian Silurian Ordovician Cambrian	Palaeozoic
Cuddapah and Kurnool formations (Purāna group)	Algonkian	
Dharwar system, Charnockite series, Granites, Gneisses, and Schists	Archæan	

CHAPTER VIII

MINERALS

In the preceding chapter, some of the minerals which are met with in the various geological formations have been mentioned. It remains to deal more in detail with the most important minerals in the area under consideration.

Asbestos, which received its name, meaning unquenchable, from the Greeks, because it is unaltered by heat, is found in abundance in the Chāmrājnagar tāluk of the Mysore State. It is a variety of hornblende, which occurs in long silky fibres, and was, in days of old, used at the cremation of the dead, so that the ashes of the corpse might be kept distinct from those of the fuel. It is at the present day used for lining iron safes, as a packing for steam-pipes and boilers, and, when short-fibred, for the manufacture of paper and cardboard.

The **Beryl** or **Aquamarine** mines at Padiyur (Pattalai) in the Dharapuram tāluk of the Coimbatore district were worked in the early part of the last century by Josiah Marshall Heath, who secured 2,196 stones valued at £1200. The discovery of coins of the Roman Emperors Augustus, Tiberius, Claudius, and others, in the neighbourhood, has been used as evidence that there was considerable commerce between the ancient inhabitants of the locality and the Roman traders. It is recorded by Pliny, in his *Natural History*, that the best beryls, which he recognised as being a variety of the emerald, are those which (like those at Padiyur) have the green colour of pure sea-water, and come from India.

Chromite has a chemical constitution analogous to magnetite (magnetic iron-ore), but differs from it in composition by the replacement of a portion of the iron oxide by chromic oxide. It is frequently found associated with the igneous rocks, such as the olivine rocks, which also contain large quantities of magnesia. In this association it is found in various parts of South India. An attempt was made by Mr Heath to work the chromite found associated with magnesite in the low hills between the town of Salem and the Shevaroy hills, the white colour of which has given

Fig. 21. Beryl crystals.

rise to the inaccurate name of the "Chalk Hills." The chromite deposits of the Mysore State first received serious consideration in 1906, when licenses were granted for their exploitation, which, however, does not appear yet to have developed into a regular industry, although the amount raised in 1907 was 11,000 tons. As in the Salem district, the chromite of Mysore is found associated with ultra-basic rocks, such as olivine rock and the product of its alteration, serpentine. The most important deposits known appear to be those situated near the village of Kadakola in the Mysore district, but other occurrences have been detected

in the Hassan and Shimoga districts. Chromite is the principal natural source of chrome compounds, and the largest portion of the mineral raised is devoted to the manufacture of the salts of chromium used as dyes and pigments, and in tanning operations. A smaller fraction is devoted to the manufacture of refractory chrome bricks for lining furnaces, and of chrome steels, which are largely used for armour-plating on account of their great toughness.

Copper ore was discovered in a vein near the village of Yerrapulli in the Nellore district in 1801. Large sums of money were lost in mining operations in the first half of the last century. It is worthy of note that the ore is associated with rocks which resemble in geological relationship and lithological characters those known as the Lower Huronian in America, which are referred in India to the Dharwar system of rocks, in which the gold deposits are also found.

The **Corundum** (Sanskrit, *korund*), of which extensive deposits occur in South India, lacks the gem lustre of the rubies of Burma and blue sapphires (*nīlam*) of Kashmir, which are varieties of this mineral. Ranking in hardness next to the diamond, it is in demand as an abrading agent in metal-work and stone-cutting in India and other countries. It is the richest natural compound of the metal aluminium, but, on account of its physical characters, is not suitable to replace bauxite as a source of the metal. Its distribution in Southern India has recently been systematically surveyed, more especially in the Coimbatore and Salem districts, and in Mysore. The mineral occurs in a great variety of forms, such, for example, as lumps of a grey, greenish-grey, or flesh-colour, or purplish-brown hexagonal prisms, often found as large crystals in a matrix of finely granular felspar. In some places, e.g. at Karutapalaiyam in Coimbatore, mining or digging out of corundum

is an active industry on a small scale, and the waste-lands are taken up for the purpose. At Gopichettipalaiyam, in the same district, the mineral is collected in isolated crystals in the fields, and sold to a contractor from Madras.

Diamond-mining was an important industry in the Kistna district in the days when the Kings of Golconda

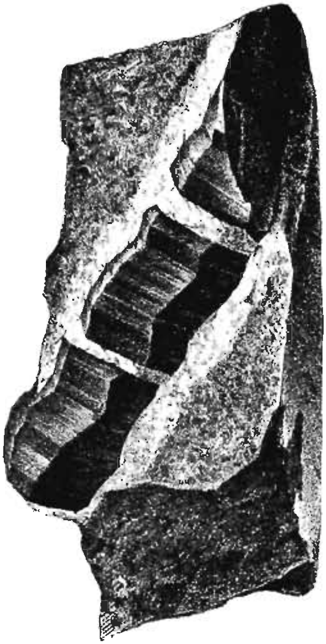

Fig. 22. Crystal of Corundum with its shell of cleared felspar forming the crystal "court" or crystal "compound."

ruled over it. The French traveller Tavernier, who visited the Kollur mines in the seventeenth century, records that 60,000 men were engaged therein. He mentions a diamond weighing 280 carats as being in the possession of the Moghul Emperor Aurangzīb. This gem was probably the Koh-i-nur (mountain of light), which is now among the

crown jewels of England, having been presented to Queen Victoria on the annexation of the Punjab in 1849. According to tradition, this diamond was found near the Kistna river, and worn five thousand years ago by one of the heroes of the Mahābhārata. The Regent or Pitt diamond, purchased in 1704 when Mr Thomas Pitt was Governor of Madras, is said to have been found at Partiāla in the Kistna district. It was subsequently set in the hilt of the State sword worn by Napoleon. Pitt is said to have purchased the diamond for £20,400, and sold it to the King of France for five times as much. Concerning the transaction, Alexander Pope wrote the following lines in his Epistle to Lord Bathurst:—

"Asleep and naked as an Indian lay,
An honest factor stole a gem away:
He pledged it to the knight, the knight had wit,
So kept the diamond, and the rogue was bit."

In the Chauncey MS. the last line runs,

"So robbed the robber, and was rich as P——."

The village of Wajrakarur (*vajra*, diamond) in the Anantapur district is celebrated for its diamonds, which are said to be frequently picked up in the fields after heavy rain by villagers, who sell them to brokers. In 1881, a diamond, facetiously called the Gor-do-norr after Mr Gordon Orr the Madras jeweller, of which the original weight was $67\frac{1}{8}$ carats, was found by a villager, and sold to the Nizam of Hyderabad for Rs 1,65,000. Diamond mines were worked in former days at Banganapalle, Munimadugu, and Rāmallakota in Kurnool.

By far the largest output of Indian **Gold** is obtained from the mines in the Kolar district of Mysore. The metal is derived from a single free-milling vein or reef of blue quartz, which averages only some four feet in thickness, and yields gold in paying quantities for a little more

Fig. 23. Kolar gold-field.

than four miles. The attention of Europeans was called to the vein by the existence of numerous old native workings. A shaft was sunk by Mr Lavelle as far back as 1875, but it was not till 1883 that Captain Plummer struck the Champion lode, the discovery of which laid the foundation of the ultimate success of the Kolar gold-field, on which numerous Companies, including Champion Reef, Mysore, Nundidroog, and Ooregum, have been established. By 1903, the deepest working was more than 3,000 feet below the surface. The gold is extracted from the quartz by a combination of amalgamation and treatment with potassium cyanide. The tailings, or powdered refuse of the stamped ore, are heaped up in big mounds, and are sometimes treated a second time, to secure such gold as still remains in them. The mines have, since 1902, been supplied with electric power from the Cauvery falls, which are 92 miles distant. An attempt to establish a gold-mining industry in the Nīlgiri Wynaad between 1880 and 1884 ended in financial disaster. The machinery sent out from England may still be seen, covered by jungle, or lying on the roadside. A slender living is made in various localities by a class of people called Jalagadugu (*jala*, water; *gadugu*, wash), who extract gold from the bed of rivers or nullahs (watercourses). The Kurumbas of the Nīlgiris also obtain small quantities of gold by alluvial washing. In the city of Madras, gold-washers search for gold in the drains near jewellers' shops.

Graphite, plumbago, or blacklead, which, like the diamond, is a form of carbon, is worked on a commercial scale in the Nedumangād and Neyyāttinkara tāluks of Travancore, and in the Bhadrāchalam tāluk of the Godāvari district. Graphite of good quality further occurs in the Singampatti zamindari of Tinnevelly. In its purest form, the mineral is the material from which lead pencils are made, and it is also used for polishing grates and

pottery, for the manufacture of crucibles, and as a lubricant for machinery.

The smelting of **Iron** by primitive methods has been carried out by Indians from very early times, and old-fashioned furnaces may still be found at work in remote places, where imported iron and steel are not available. An interesting fact is that the earthen crucibles used at the present day correspond both in size and shape with those

Fig. 24. Pariahs smelting small "blooms" of wrought iron, Salem district.

which were discovered during the excavations at the ancient burial-place at Aditanallur. The wootz steel, made in the Trichinopoly district and other localities, has long been celebrated, and it has been conjectured that the famous Damascus sword-blades were manufactured from it. In 1830, an Iron Company was established by Mr Heath at Porto Novo in the South Arcot district, with a view to manufacture bar iron from the indigenous ores, but the

enterprise ended in failure, after a struggle extending over many years. Quartz-iron-ore schists form thick bands of considerable dimensions in the Salem district, the Mysore State, etc., but it has not as yet been found possible to work them on a large commercial scale. And, for the present, the iron industry remains confined to native "bloomeries."

Magnesite (carbonate of magnesium) occurs in the form of white veins in the olivine rocks in the "Chalk Hills" of the Salem district. The white deposit is believed to be made up of the bones of the mythological bird Jatayu, which fought with Rāvana to rescue Sīta from his clutches. During the last few years the average production of the mineral has been 2,254 tons per annum. As it is of unusual purity, it is likely to be useful for the manufacture of plaster, tiles, etc., and also in refractory linings for furnaces, and as a dephosphorising agent in the steel industry.

Of the various ores of **Manganese**, psilomelane and braunite form the bulk of the ores exported from India. A rapid development in the mining or quarrying of these ores has taken place within the last few years. The industry in the Vizagapatam district had its origin in 1891, when Mr H. G. Turner, the Collector of the district, noticed that railway contractors were breaking up blocks of manganese-ore for ballast. As a result, the Vizianagram Mining Company was floated. In 1905, the deposit of manganese-ore at Rāmandrūg in the Sandur State was opened up, and a monopoly of the manganese and iron ores of the State secured by the General Sandur Mining Company. In the following year, the Mysore Manganese Company was formed, to take over concessions in the Shimoga district, and its success led to a rush for manganese concessions in several districts of the Mysore State. When in hard, compact masses, the ore is hand-drilled, and blasted. Otherwise it is simply prized out with

crowbars. The huge blocks thus detached are broken up with sledge-hammers, and carried up the hill, or out of the quarry, on the heads of coolies. The ore, which is exported to England, the United States, and Germany, is utilised

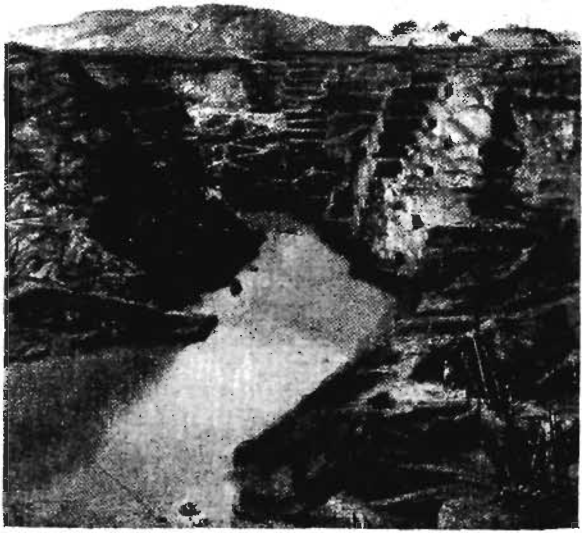

Fig. 25. **Manganese quarry, Kodur, Vizagapatam district.**

in the manufacture of iron and steel. The ore has been used in India, from remote times, for colouring glass and enamels. At the present day it is also used for imparting a dark colour to tiles and biscuit-ware.

Mica, which is obtained in large quantities from the Nellore mines, occurs in the form called muscovite (*vitrium muscoviticum* or Muscovy glass), owing to its use in Russia in place of glass for windows. The ancient Hindu writers recognised four classes of mica, corresponding to the four castes of Manu, viz., Brahman, white; Kshatriya, red-tinted (ruby mica); Vaisya, yellow; Sūdra, black. The

Fig. 26. Mica crystals in the rock. Inikurti quarry, Nellore district.

mineral in Nellore, which is characterised by a greenish tinge, forms a constituent of the granite pegmatites, mainly composed, like ordinary granite, of quartz, felspar, and mica, in which the crystals have developed on a gigantic scale. Crystals or "books" of mica have, in fact, been obtained from the Nellore mines, measuring 10 feet across the basal plane, and rectangular sheets, free from cracks

and flaws, sometimes measure as much as 30 x 24 inches. The mineral is worked in wide, open quarries, distributed among the four mining zones of Gudur, Rapur, Atmakur, and Kavali, and bearing, in some cases, the name of a Hindu deity, e.g. Venkatēswara and Mahālakshmi. Mica commands a special price in the commercial market, because it is a non-conductor of electricity, is able to stand great heat and rapid changes of temperature, is transparent to light, almost opaque to radiant heat, and is tough and elastic. This combination of features is not obtained in any other natural substance, and cannot be readily imitated artificially. Consequently, mica is used in covering the armatures of dynamos, as lamp chimneys, as coverings for the peep-holes of high temperature furnaces, for photographic films, and for window-panes in places exposed to great changes of temperature or violent vibrations. In India there is a demand for mica at the Muhammadan Mohurram festival for the decoration of taziahs or taboots, processional lamps, banners, etc. Waste scrap and pulverised mica are used for a variety of purposes, such as non-conducting packings and jackets for boilers and steam-pipes, the manufacture of lubricants for machinery, and as a base for soap. The invention of micanite has created an opening for the use of the smaller grades of mica, which were formerly discarded as waste. Of the world's total supply of mica, over 60 per cent. by value is obtained from India, more than a quarter of the Indian production being from the Madras Presidency. Over 7,000 workers are employed on an average daily at the Madras mica mines.

Since 1908, considerable attention has been paid to certain beach sands on the Travancore coast, which have been found to contain considerable proportions of **Monazite**, samples of which have yielded, on analysis, 12 per cent. of thoria, the substance that gives it its commercial value on account of its highly incandescent properties. The deposits

are still being prospected, and 2 cwt. of the material have been sent for analysis to the Tata Institute, Bangalore.

Salt or "common salt" (chloride of sodium), the production of which is a Government monopoly, is manufactured, under the supervision of the Salt Department, in factories on the shores of the Bay of Bengal and Gulf of Manaar by concentrating sea-water in shallow evaporating pans formed by levelling and embanking the ground. In the Ceded Districts, and especially in Bellary, mounds of earth, called modas, survive as memorials of the days when the Upparas (salt-workers) manufactured earth-salt from saline soils, for consumption by the poorer classes and cattle.

Saltpetre or nitre (nitrate of potassium) is manufactured, under license from the Salt Department, by lixiviating the nitrous efflorescence in the soil, and subsequently refining it, to free it from sodium chloride and other impurities. The greater part of the refined mineral is produced in the Coimbatore and Trichinopoly districts.

Samarskite, the chief importance of which lies in the fact that it contains radium, has recently been discovered in the Nellore mica area.

Steatite (hydrous silicate of magnesium), or soapstone, as it is called owing to its greasy feel, occurs of good quality near the village of Mudvaram, seven miles from Betamcherla in the Kurnool district, where there are excavations in the dolomite (carbonate of magnesium and calcium) rock containing thin layers of the mineral. Articles for domestic use, and carved idols, are made from it in various districts. The mineral is used commercially for making gas-burners, electrical insulators, lining for stoves, etc.

Of the **Crystalline rocks** which are used for building purposes, the most beautiful are the porphyries from Chāmundi hill, Seringapatam, and other localities, which have been used as ornamental stones in the new palace of the

Mahārāja at Mysore. At Bangalore, the quarrying of the rock which is largely used as a building stone, for walls, posts for huts, etc., by means of a wood fire, which detaches large plates, has been carried to great perfection. Attention has recently been paid to the possibilities of the purple norite, which forms large masses in the hills of south-west Coorg, as an ornamental stone. The pink **sandstone** from Rāmapuram, about 40 miles north of Madras, has been used with excellent effect in the building of the Victoria Memorial Hall, Madras. The white, grey, and flesh-coloured **lime-stones** from the Madukarai beds near Coimbatore are eminently adapted for ornamental purposes, and have been utilised in the church at Coimbatore. The white variety is used for drinking-troughs for animals. The so-called Trichinopoly **marble**, which is largely made up of fossil univalve and bivalve shells, takes a fine polish, and is valuable as a decorative stone. White limestone from the Kistna district, out of which the sculptured railing of the Amarāvati stupa was carved, and the dark limestone from the Narji quarries, which provides the building-stones known as Cuddapah slabs, are largely used for mosaic floorings. The limestones of the Kistna and Kurnool districts have been used as lithographic stones. **Chunam** (lime), made of calcined shells, when specially prepared, produces a fine plaster, known as polished chunam, which has a shining white surface like polished marble.

On the west coast, **laterite**, cut into big bricks, is largely used in the construction of houses.

A fine **clay**, which is found in various places in South Canara, especially along the Netrāvati river, supplies the material from which the well-known Mangalore tiles are made. Clays, and kaolin (china-clay) produced by the decomposition of the felspar of granite, occur in many districts, and are used in the manufacture of pottery and earthenware.